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ABSTRACT

The secondary math activities materials developed by the North Dakota Exemplary Project represent information that will be helpful to teachers in achieving the goals of a career education program. The guide provides a flexible framework to provide experiences that will support the learning principles needed to attain the required knowledge, attitudes, and skills essential to productive living integrated into the existing curriculum. A brief explanation is offered of career education--its definition, philosophy for the secondary level, specific secondary objectives, summary of career education objectives, and the need for career education. The needs of the students, involvement in the world of work, and classroom facilities should set the stage for the selection of resource units to be used. Within the mathematics area activities are organized by the career education elements of: self awareness, career awareness, appreciations and attitudes, economic awareness, and educational awareness. Each broad objective includes specific behavioral objectives, a suggested subject area and grade level, learning activities, suggested teaching techniques, resource materials and worksheets. Supplemental materials are appended. (Author/BP)

EL105090

SELF-AWARENESS

EMPLOYMENT TRENDS

WORK ATTITUDES

BUDGETING

MATH

CAREER PLANNING

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GRADES 7-12

DECISION MAKING

GOALS - VALUES

OCCUPATIONAL INFORMATION

CE003326

Secondary Math Activities

of the

North Dakota Exemplary Project in Career Education

Conducted Under

Section 142(c), Part D

Public Law 90-576

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PREFACE

The 1968 Vocational Education Amendments called attention to the need for innovative programs in education that would help students bridge the gap between school and work. In response to this legislation the State Board for Vocational Education in cooperation with the Department of Public Instruction, the Bismarck Public School District, and others have initiated a developmental program in Career Education. This program has been developed and field tested in the Bismarck District and other schools that have asked to become involved during 1970 - 1973.

The following materials have been compiled by the staff of North Dakota's Exemplary Career Education Program with the assistance of many individuals and groups. The contents are designed as ideas that could be used to develop various Career Education concepts and objectives. The activities are to be integrated into your existing curriculum, sequenced, and adapted to meet the needs of all people involved in education at the local school.

ACKNOWLEDGMENTS

The staff of the State Exemplary Project in Career Education gratefully acknowledge the help of the teachers, administrators and counselors in the Bismarck Public Schools for assistance in the development and field-testing of the suggested activities.

In addition to the personnel in the Bismarck School District many individuals and groups contributed to furthering the effort of Career Education in North Dakota. The project staff extends a special thank you to the staff of the State Board for Vocational Education, members of the Department of Public Instruction, and all other school districts, agencies, and individuals that helped make this publication a reality.

PURPOSE OF THIS GUIDELINE

The Career Education reference material included in this guideline represents information that will be helpful to teachers in achieving the goals of a Career Education program.

The guide provides a flexible framework to provide experiences that will support the learning principles needed to attain the required knowledge, attitudes and skills essential to productive living. Within this flexibility, there is no planned sequence of study in this guide. The needs of the students, the involvement in the world of work and the classroom facilities should set the stage for the selection of resource units to be utilized.

This guide does not provide a framework for a separate unit on careers. Rather, it is expected that learning experiences from the guide will be incorporated into existing units of instruction.

This guide is organized around 16 major objectives. To achieve these objectives the activities include expected student behavior and suggested learning experiences. Teachers are encouraged to add other goals and learning experiences which they have found successful.

The Career Education activities in this guide have been organized in the Table of Contents as they relate to the elements of the Career Education Program. With this structure, the teacher has a ready reference for the selection of an activity appropriate for working with that element. In using the activities, the classroom teacher should make special note of the format as it applies to the student and teacher needs. Provisions have been made for a broad objective and supportive techniques. Also, suggested resources have been listed to help the teacher and student work out a plan of study. It is not intended that the teacher be limited to the activity as presented. Rather, it is to be thought of as a point of departure in accomplishing the desired objectives.

DEFINITION OF CAREER EDUCATION

"Career Education represents the total effort of public education and the community to help all individuals become familiar with the value of a work oriented society, to integrate those values into their personal value structure, and to implement those values in their lives in ways that make work possible, meaningful, and satisfying to each individual." Dr. Kenneth Hoyt

Career Education is an integral part of education. It is a concept that includes as its main thrust the preparation of all students for a successful life of work by increasing their options for occupational choice and attainment of job skills, and by enhancing learning achievement in all subject matter areas. Career Education is a series of growth experiences which begins in the home and continues at the pre-school and elementary, junior high and senior high, post-secondary and adult levels of education. Emphasis is placed on career awareness, orientation and exploration of the world of work, decision-making relative to additional education, preparation for employment, and understanding the interrelationship between a career and one's life style. It provides purposefully planned and meaningfully taught experiences which contribute to self-development as it relates to various career patterns. Career Education calls for a total effort of the home, school and community to help all individuals become familiar with the values of a work oriented society, to integrate these values in their lives in a way that work becomes useful, meaningful and satisfying.

CAREER EDUCATION PHILOSOPHY

Secondary

Career Education is that one aspect of life-long individual development which relates to the occupational needs of the individual and which occurs with social, emotional, intellectual and general personal development. All facets of individual development are integrated with each other in a life-long continuing process.

Career Education in the secondary school provides for broad based occupational exploration including classroom, shop, laboratory and field experiences in a variety of occupational areas.

It is designed to assist secondary students, through an interdisciplinary approach, develop a more realistic plan for their own careers. The activities provide for further development of self-concept, self-appraisal of abilities, interests and aptitudes; understanding of education avenues; appreciation of economic and social values of work and an awareness of the decision making process.

The decision-making process is an important facet of career development at the secondary level. The student relies heavily on pre-high school experiences relating to awareness and exploration experiences of the individual in the career education activities on the elementary level.

The decision-making process is not a "one shot" deal but rather an end result of many experiences throughout the lifetime of an individual. Whether or not the decision will be a realistic one for the individual depends on how he sees himself in relation to the total picture. Therefore, career education necessarily becomes a lifetime process since decisions are constantly being made by the individual.

Educational curriculums and other experiences usually consider the physical, emotional, intellectual, and general educational development but, unless coincidental, fail to consider the other aspect of career education in the overall educational process. In light of this void in the curriculum, activities or experiences must be provided each student by the classroom teacher. No one individual or department in the school system can achieve the desired goals alone.

Many of the activities provide an opportunity for the students to visit the business community and observe workers on the job at all levels, including semi-skilled, skilled, technical, and professional occupations. Students will interview workers to learn their respective feelings about their occupation, the educational requirements, work settings, benefits, work hours, and job characteristics relative to self-characteristics.

The secondary student must be cognizant of the options before him and through classroom or subject matter related experience be reminded of the resources, both intellectual and materialistic, from which he can draw in making a realistic decision; he must be equipped to deal with the decision as it affects his future; be prepared to make necessary adjustments demanded by his environment; in general begin planning and preparing for adult living.

SPECIFIC SECONDARY OBJECTIVES

1. To create self-awareness of students' interests, abilities and aptitudes.

2. To help students set realistic goals in light of knowledge about themselves.

3. To relat~~ that technology~~ affects the number and types of careers and to il ~~s~~trate the inte~~r~~dependency of workers.

4. To acquaint students with the various aspects of community job resources, job hunti~~n~~g, applying, interviewing and securing employment.

5. To show a relationship ~~b~~etween school subjects and opportunities that exist throughout life.

6. To familiarize students with sources and uses of occupational materials in the library and/or counselor's office.

7. To become aware of employment trends and outlooks, employer-employee relationsips and the distribution and mobility of employed persons.

8. To investigate projected needs for various workers and the career patterns involved with these workers.

9. To acquaint students with the basic economics, budgeting, and the importance of fringe benefits when considering employment.

10. To acquaint students with labor unions, apprenticeship programs, and journeyman programs.

11. To expose students to a full range of occupational opportunities.

12. To understand goals, values, and aspirations and how they relate to the choice of a career.

13. To develop basic problem-solving techniques.

14. To acquaint students with the need for continuing education.

15. To help students make a realistic choice of post-secondary plans.

16. To help students make the necessary adjustments for adult living.

SUMMARY OF CAREER EDUCATION OBJECTIVES

I. PREPARE FOR MAKING CAREER DECISIONS

- A. Know own characteristics relevant to career decisions.
- B. Know the characteristics and requirement of different careers and occupations.
- C. Relate own personal characteristics to occupational requirements.
- D. Plan for career education or change.

II. IMPROVE CAREER AND OCCUPATIONAL CAPABILITIES

III. POSSESS SKILLS THAT ARE GENERALLY USEFUL IN THE WORLD OF WORK

- A. Have generally useful numerical skills.
- B. Have generally useful communication skills.
- C. Have generally useful manual-processing and decision-making skills.
- D. Have generally useful interpersonal skills.
- E. Have employment-seeking skills.

IV. PRACTICE EFFECTIVE WORK HABITS

- A. Assume responsibility for own behavior.
- B. Plan work.
- C. Use initiative and ingenuity to fulfill responsibilities.
- D. Adapt to varied conditions.
- E. Maintain good health and grooming.

V. HAVE POSITIVE ATTITUDES TOWARD WORK

- A. Recognize the basis of various attitudes toward work.
- B. Hold competence and excellence in high regard.
- C. Seek personal fulfillment through own achievements.
- D. Value work in terms of societal goals.
- E. Pride in work improves quality.

VI. HAVE A POSITIVE IMAGE OF SELF

- A. Understand feelings toward myself and others.
- B. Understand and accept my similarities and differences.
- C. Identify, clarify, accept, or change my values.
- D. Assume responsibility toward self and society.
- E. Recognize inherent capabilities.

NEED FOR CAREER EDUCATION

A fundamental purpose of education is to prepare people to live a productive and rewarding life. For far too many Americans our schools are failing in this essential mission.

In typical schools throughout the country young people complain that curriculums are dull and irrelevant, that their education is not opening pathways to a fulfilling adulthood. Substantial numbers of students score below their grade level in basic skills; high dropout rates, absenteeism, academic failure, drug abuse, vandalism, and assaults on administrators, teachers, and pupils signal their discontent.

It is a rare school that equips all its students to make the choice upon graduation of entering the job market with a salable skill or of continuing their education. Too often the graduate has neither option, let alone the opportunity to select one or the other.

Nearly 2.5 million students leave the formal education system of the United States each year without adequate preparation for a career. In 1970, not counting enrollment in homemaking, only about one high school student in six was enrolled in occupational preparation. More persons are graduating from a 4-year college with a bachelor's degree than there are jobs for degree holders. By the end of this decade eight out of ten jobs in America will not require a baccaluareate degree.

In a modern society, formal education stands directly between a person and his ability to support himself and his family. If the quality or the appropriateness of any child's formal education is poor, what might have been a roadway to opportunity will remain a barrier. To fail to fulfill a responsibility in this respect means to render a large proportion of the future citizens of this country economically obsolete.

More appropriate curriculums must be developed, validated, and installed and they must be used more realistically if we are to meet the needs and desires of students and serve the purposes of society.

Taken from

Career Education
S. P. Marland, Jr., Commissioner
DHEW Publication No. (OE) 72-39
1971

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To acquaint students with general characteristics of people in mathematics.

SPECIFIC BEHAVIORAL OBJECTIVE: Each student will list four characteristics of people in mathematically orientated jobs and will relate these characteristics to himself.

SUGGESTED SUBJECT AREA Math

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Identify characteristics that fit the image of a mathematician	Duplicate and hand out for discussion the following: S. R. A. Jobs In Mathematics #8 P. 7, "The Ties that Bind." Qualities common to all mathematics 1. Method - system of logic in order to reach conclusion. 2. Symbolism - all people can easily read and results are concise and clear. 3. Pattern - finds order amongst chaos. 4. Beauty - Rhythm and order are pleasing wherever they exist. Have each student list the above qualities and tell how he does or does not identify with them.	S. R. A. Jobs In Mathematics #8 Mathematicians Staticians Occupational Outlook Handbook Occupational Guidance kit Finney Company - Minnepolis,Minn.

SUGGESTED CORRELATION FOR THIS ACTIVITY:

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To show students that all jobs have a need for mathematics

SPECIFIC BEHAVIORAL OBJECTIVE: Each student will list six math related occupations and illustrate the specific math concept used in each occupation.

SUGGESTED SUBJECT AREA Mathematics

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Through individual investigation, students will become acquainted with the practicality of everyday mathematics and its application to the world of work.	1. Give students an example of one job that requires a basic knowledge of math. 2. Have students pick five more occupations (example: service station operator, auto mechanic, nurse, doctor, etc.) and let them explain how each uses mathematics in their everyday work. 3. Discuss the results.	Finney's Occupational Guidance Kit Occupational Outlook Handbook Dictionary of Occupational Titles Attached Sample

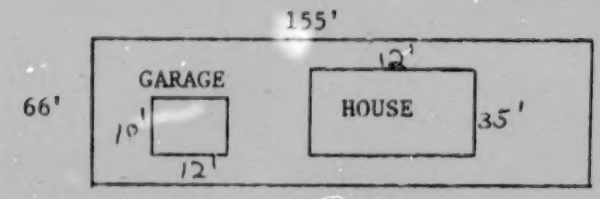
SUGGESTED CORRELATION FOR THIS ACTIVITY:

STUDENT EXAMPLE

1. Clerk

Sales Slip
1.45 pro
1.28 meat
.45 groc
.69 groc
.75 groc
$4.62
.16 tax
4.78 total
10.00 amount
5.22 change

2. To Surveyor - House and Yard Lot



A=bh
A=(155) (66)
A=10,230 sq. ft.

A=bh
A=(10) (12)
A=120 sq ft

A=bh
A=(12) (35)
A=420

A=Total Sq. Ft.
A=10,230 - 540
A=9,690 sq. ft.

3. Chevrolet Garage

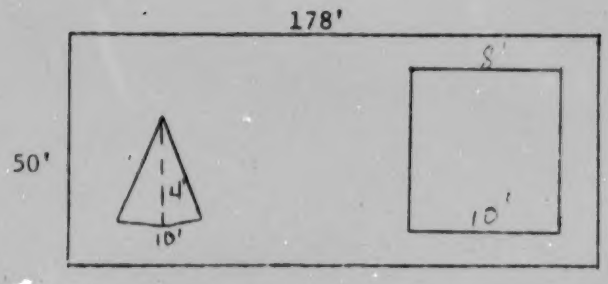
Service Slip

Muffler	4.89
Rocker arm	9.99
(2) brake shoes	10.85
wheel alinement	55.76
labor	19.95
	101.44 total

4. Painter - Wall, Paint, Plans

A=bh
A=(50) (178)
A=8,900 Sq. Ft.

A=½bh
A=½ (4x10)
A=20sq ft



A=bh
A=(8) (10)
A=80

A=8,900-100
A=8,800 Sq. Ft.

Total area to be painted is 8,800 square ft.

5. Nurse Medicine chart

.23 cc pen.
.10 cc mor.
.33 cc total

6. Payroll accountant

H.Wor.	H.W.	S.S.	S.T.	Dep	check record
40	$7.50	$22.91	$17.35	4	Salary
					$300.00
				$.700 each	-40.26
					-28.00
					$231.74 total salary

CAREER DEVELOPMENT ACTIVITIES

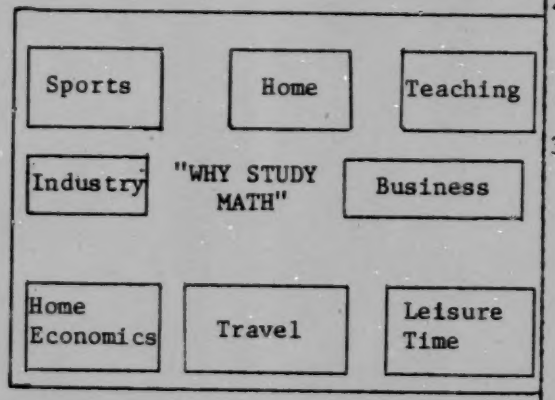
BROAD OBJECTIVE: To aquaint the student with the need for Mathematics in everyday living.

SPECIFIC BEHAVIORAL OBJECTIVE: After making posters and setting up the bulletin board the students will become aware of the need of mathematics in everyday living.

SUGGESTED SUBJECT AREA Math

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Have the students make up bulletin board on "Why study Math".	1. The students will set up a bulletin board using posters of their own or ones obtained through the resource materials. 2. The students should be specific in their ideas. Example - (sports can be broken into specific areas such as baseball or bowling. 3. This should be used in the fall of the year.	Posters on Arithmetic in Occupations by Dave Newton Weston Walch



SUGGESTED CORRELATION FOR THIS ACTIVITY:

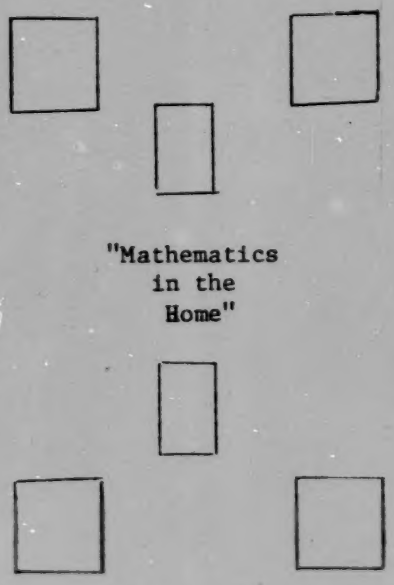
CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To acquaint students with the use of mathematics in the home.

SPECIFIC BEHAVIORAL OBJECTIVE: After exposure to bulletin board and posters which relate math problems to the home, each student will demonstrate a knowledge of the relationship of math to the home by listing at least seven examples of the use of math in the home.

SUGGESTED SUBJECT AREA Math

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
While making the bulletin board, students will become aware of use of mathematics in the home. They illustrate that math is used in every aspect of the home.  	1. Use posters on bulletin board, varying from time to time. 2. Have students make up poster of their own. 3. Use all the posters at one time, using the heading "Mathematics in the Home."	Posters: "Mathematics in the Home" J. Weston Walch, Publisher Booklet: "What Good is Math" SRA

SUGGESTED CORRELATION FOR THIS ACTIVITY:

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To acquaint students with careers that require mathematics.

SPECIFIC BEHAVIORAL OBJECTIVE: Each student will illustrate by giving an oral or written report at least three ways in which math is related to the career referred to in the field trip or by the resource person.

SUGGESTED SUBJECT AREA Mathematics

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Field trip to job site or business concern. Where field trips are not feasible, resource people may be brought in.	Review Guideline for Field Trips (See Appendix) Discuss purpose of field trip with students. Make assignments to be completed as a result of field trips. Ask students to be aware of working conditions, environment, employee attitudes, etc. "Follow-up" for evaluation of field trip.	Guideline for Field Trips (Appendix) Resource people associated with career on field trip.

SUGGESTED CORRELATION FOR THIS ACTIVITY:

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To familiarize students with math terms and related occupations

SPECIFIC BEHAVIORAL OBJECTIVE: To demonstrate a knowledge of math terms and related occupations, each student will successfully complete 80% of the enclosed crossword puzzle.

SUGGESTED SUBJECT AREA Mathematics

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Have students, in class, complete the crossword puzzle putting special emphasis on how mathematics is related to a wide variety of occupations. Stress the need for mathematics in our everyday living.	1. Introduce activity by refreshing student's memory on how crossword puzzles are worked. 2. Suggest that nearly all occupations involve math to some extent. 3. Have students fill out puzzle without any assistance from other students. 4. Go through puzzle solution. 5. Discuss how each of the occupations in the puzzle uses mathematics.	Enclosed crossword puzzle Booklet: What Good is Math? Science Research Assoc Occupational Outlook Handbook Finney's Occupational Guidance Kit "What does a Forest Ranger Do?" Dodd, Mead, & Company Book: Your Future In Accounting Richard Rosen Press

SUGGESTED CORRELATION FOR THIS ACTIVITY:

ACROSS

1. Amount of surface.

3. Not exactly divisible by two; opposite of even.

4. That proportion of a circular arc intercepted by such lines.

6. The name of the sixteenth Greek letter; also found in formula for area of a circle.

7. Person who conducts his work receiving and lending money.

8. A solid generated by a line passing through a fixed point and a given plane curve; often used as drinking cups.

10. One who puts forth effort.

12. One who works with preservation of trees.

13. A builder; works with wood.

15. Sales person.

DOWN

2. One who works with any mechanical contrivance; this person is also found on a train.

5. Whole; having no fractional part; divisible by two.

6. An instrument for writing.

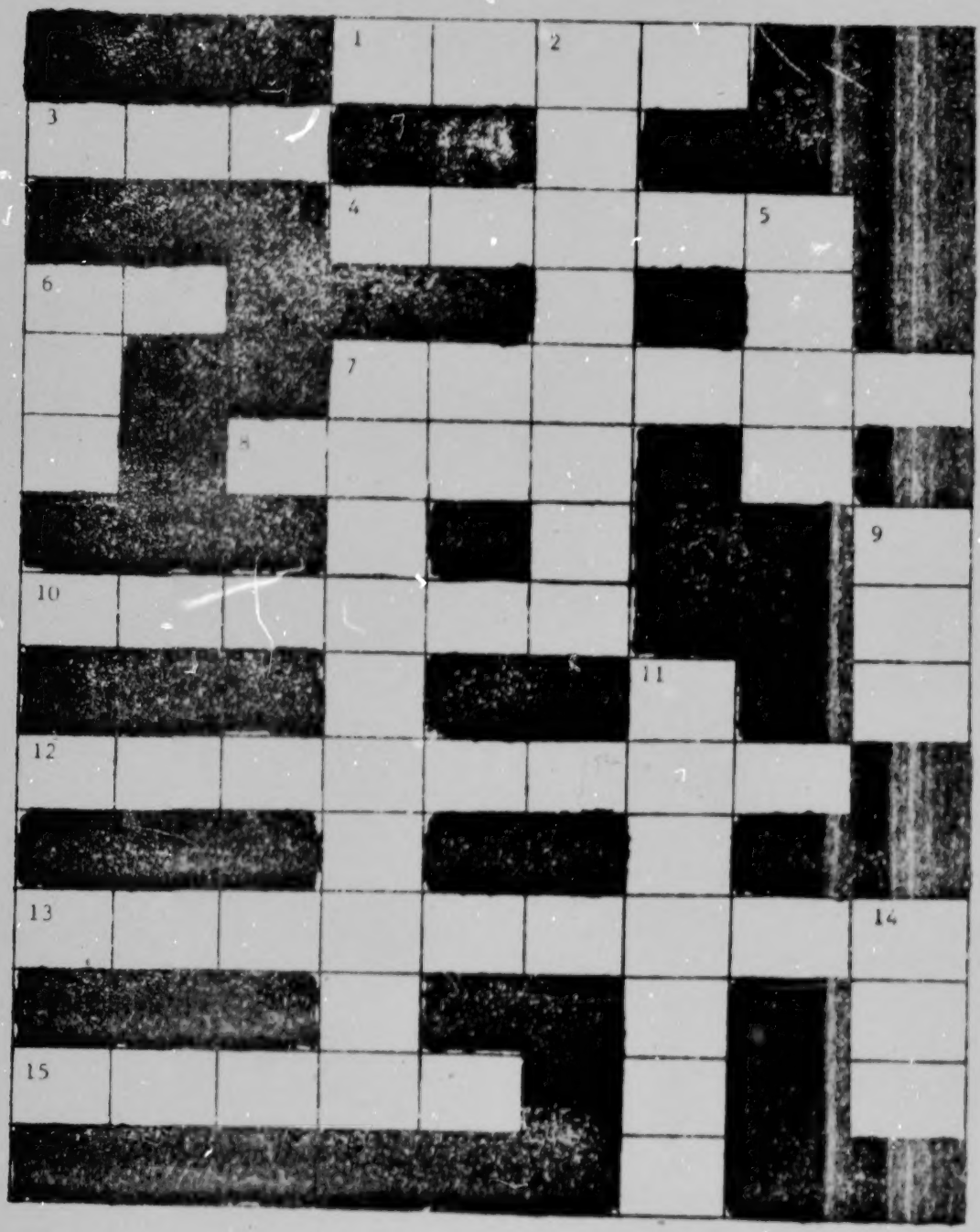
7. Person keeping records of money transactions.

9. Collection of objects.

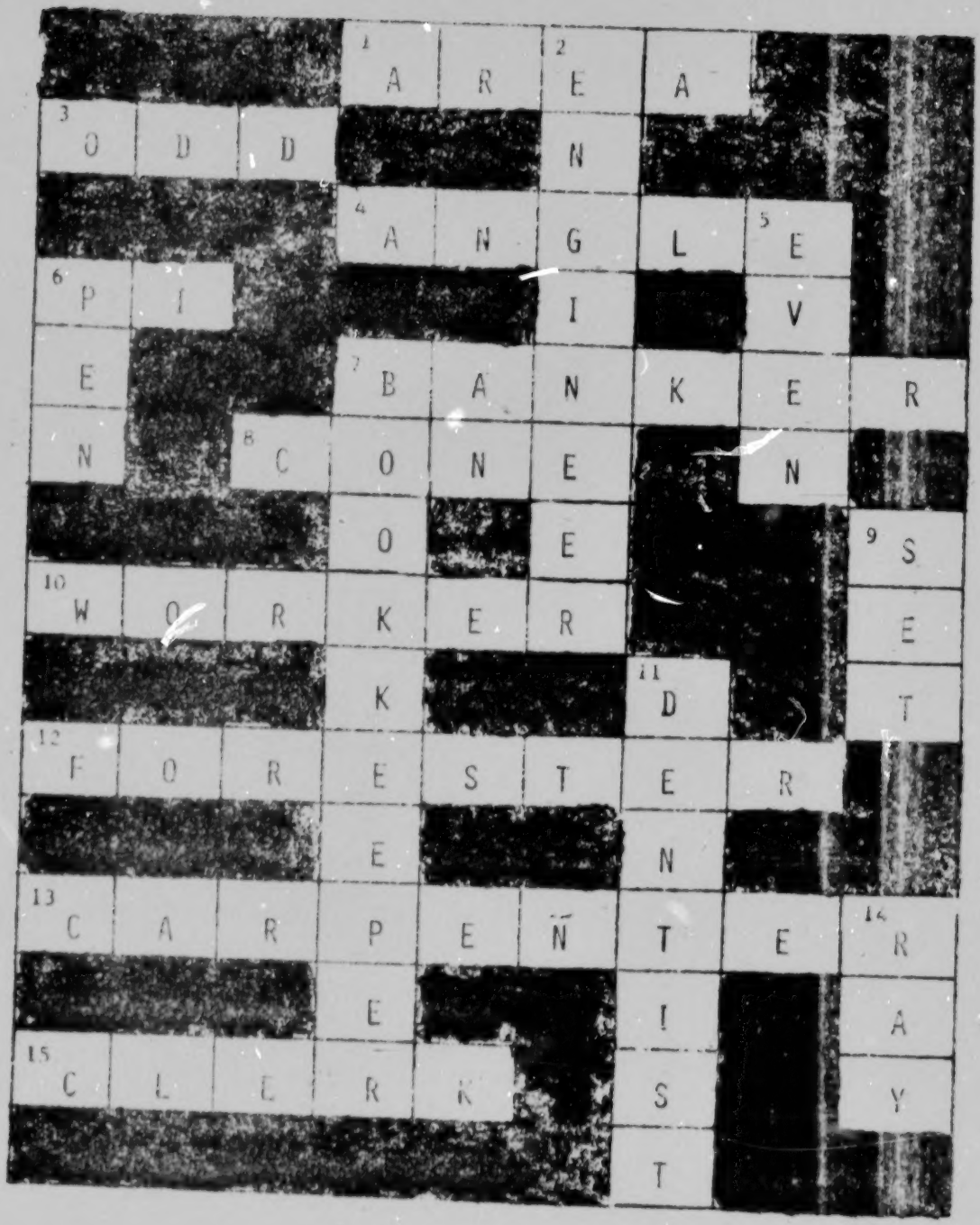
11. Person who deals with the science of treating teeth.

14. A straight line extending from a point.

MATH TERMS AND RELATED OCCUPATIONS



MATH TERMS AND RELATED OCCUPATIONS



CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To expose students to general information regarding occupational opportunities.

SPECIFIC BEHAVIORAL OBJECTIVE: After completion of this activity, the students will be able to list 8 occupations that require math and to list 2 advanced courses in mathematics.

SUGGESTED SUBJECT AREA Mathematics

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Prepare bulletin board of "Arithmetic in Occupations" posters. Show filmstrip, "Jobs in Mathematics." Administer test on problems featured on "Arithmetic in Occupations" posters.	Invariably, math teachers are confronted by students who ask, "Why do I have to take math, anyway? What good is it going to do me?" This activity is an attempt to provide students with answers to these questions. A starting point might be to point out the bulletin board and some sample occupations in which math is utilized. Maybe these occupations should be of a general nature, since the filmstrip will present jobs more specifically requiring mathematics. Example of these might be retailing, farming, construction work, banking, etc. In discussing the posters, point out that at the bottom of each, there's a math problem peculiar to that occupation. Tell the students that they should, on their own time, read the problems and be prepared to solve similar ones. A means of determining if they've followed through on these instructions would be, of course, to test them, using problems similar to those on the posters.	Sets of Posters: Arithmetic in Occupations Math in the Home Math in Life Algebra in Occupations Opportunities in Mathematics Weston Walch, 919 Congress St., Box 658, Portland, Maine 04104 Filmstrip: "Jobs in Mathematics" Set D-21, #395 Popular Science Publishin Co., Inc./Audio-Visual Division, 358 Lexington Avenue, New York, NY 10017 Booklets: What Good is Math? #5-1173 School Subjects and Jobs #5-1180 Guidance Series Booklets, Science Resear Associates, Inc., 259 E. Erie St., Chicago, IL 60611

SUGGESTED CORRELATION FOR THIS ACTIVITY:

CONTINUATION ACTIVITY SHEET

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
	Show the filmstrip. As was previously mentioned, the film depicts occupations which are strongly math oriented, such as accounting, actuarial work, etc. During the discussion of the filmstrip might be an appropriate time to mention other information concerning math and jobs as found in the additional resource materials. Also, point out to the students the high school courses that they should be considering, depending on their career interests and the amount of math they will need. The booklet, School Subjects and Jobs, for example, lists many different job areas and the degree of math training needed for each.	

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To show the relation between subject matter and jobs.

SPECIFIC BEHAVIORAL OBJECTIVE: After completion of this activity, the students, given the size of the area and cost per square yard, will be able to compute the total cost of seeding an area containing circles.

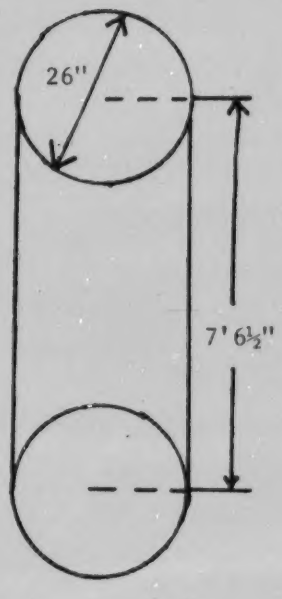
SUGGESTED SUBJECT AREA Mathematics

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Give the formula for the AREA and CIRCUMFERENCE of a circle and explain the operation of these formulas.	1. Have student work on assignment on area and circumference of circles. 2. Give the students some problems about finding the lengths of belting around two equal pulleys. 3. Give the students some problems about finding costs of seeding grass or landscaping on oval, shaped track field.	1. Vocational and Technical Mathematics in Action Hayden Book Co. by Samuel Levine 2. Textbook

SUGGESTED CORRELATION FOR THIS ACTIVITY:

Attachment to Mathematics - 8 activity on area and circumference.

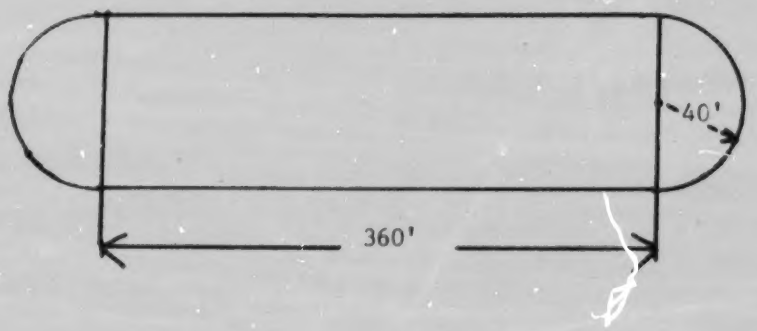


1. To find the total length of belting, you will add two half circumferences (or one whole circumference) to twice the distance between the centers of the pulleys.

   USE: $C = \pi D$

2. Find the cost of seeding grass on a track field shown below. Seed costing 21 cents per square yard.

   USE: Area of rectangle; $A=bh$
   Area of circle; $A= \pi R^2$



CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To show the relationship of subject matter to occupations.

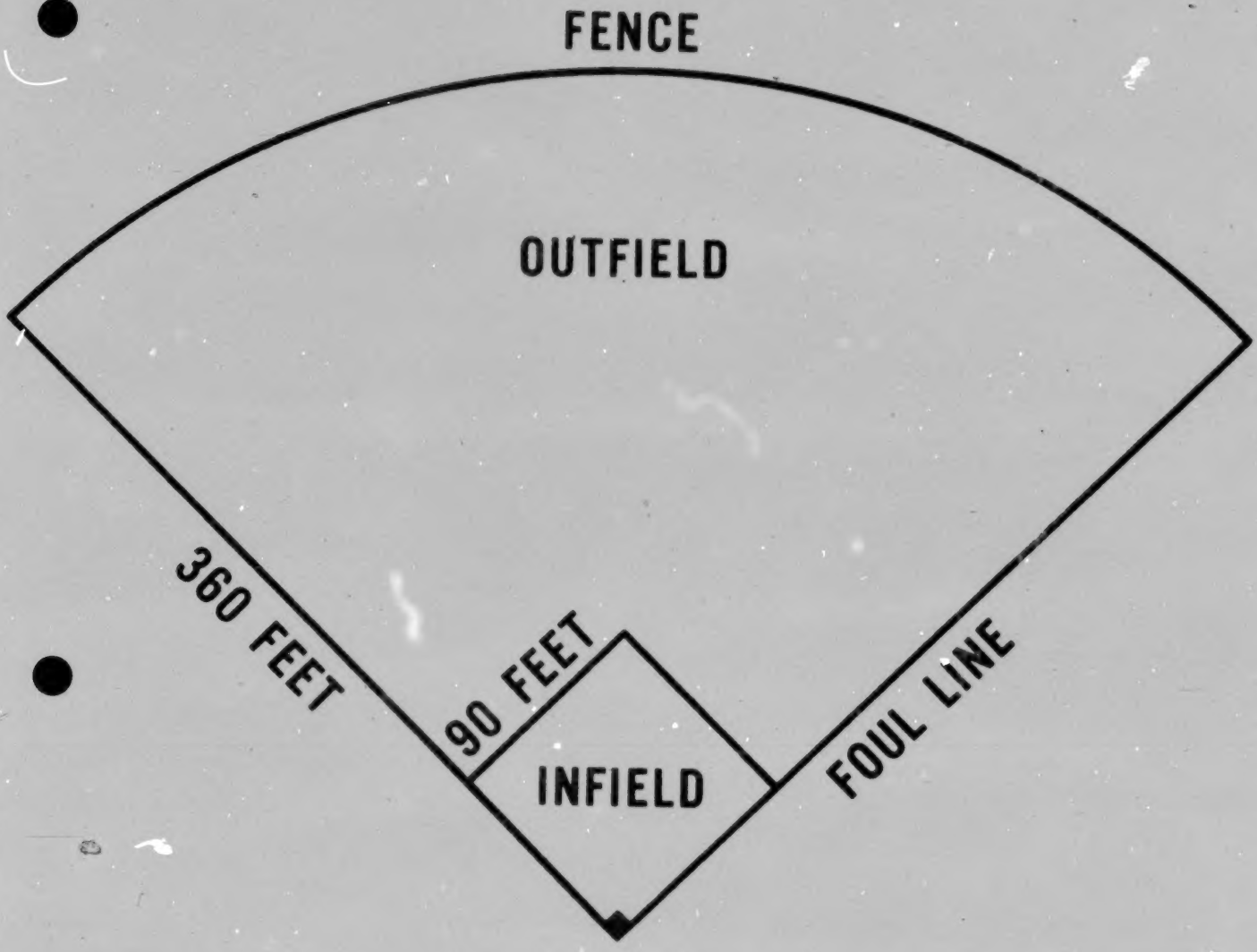
SPECIFIC BEHAVIORAL OBJECTIVE: After calculating five problems which demonstrate a knowledge of areas and perimeters, each student will list at least three occupations in which this knowledge is used.

SUGGESTED SUBJECT AREA Mathematics

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
By illustrating to students the practical application for areas and perimeters they will become aware of the importance of this knowledge.	1. Ask students to compute textbook problems to prove they understand areas and perimeters. 2. Through discussion, ask students to list as many workers as they can that use this knowledge and tell how they use it. 3. Some examples of the use would be helpful: a. laying carpet b. painting a house c. putting down lineoleum or tile d. etc.	Regular textbook Any worker that uses areas and perimeters Stores selling paints, carpets, etc. Essential Mathematics for Skilled Workers John Wiley & Sons

SUGGESTED CORRELATION FOR THIS ACTIVITY:



FINDING PERIMETER AND AREA:

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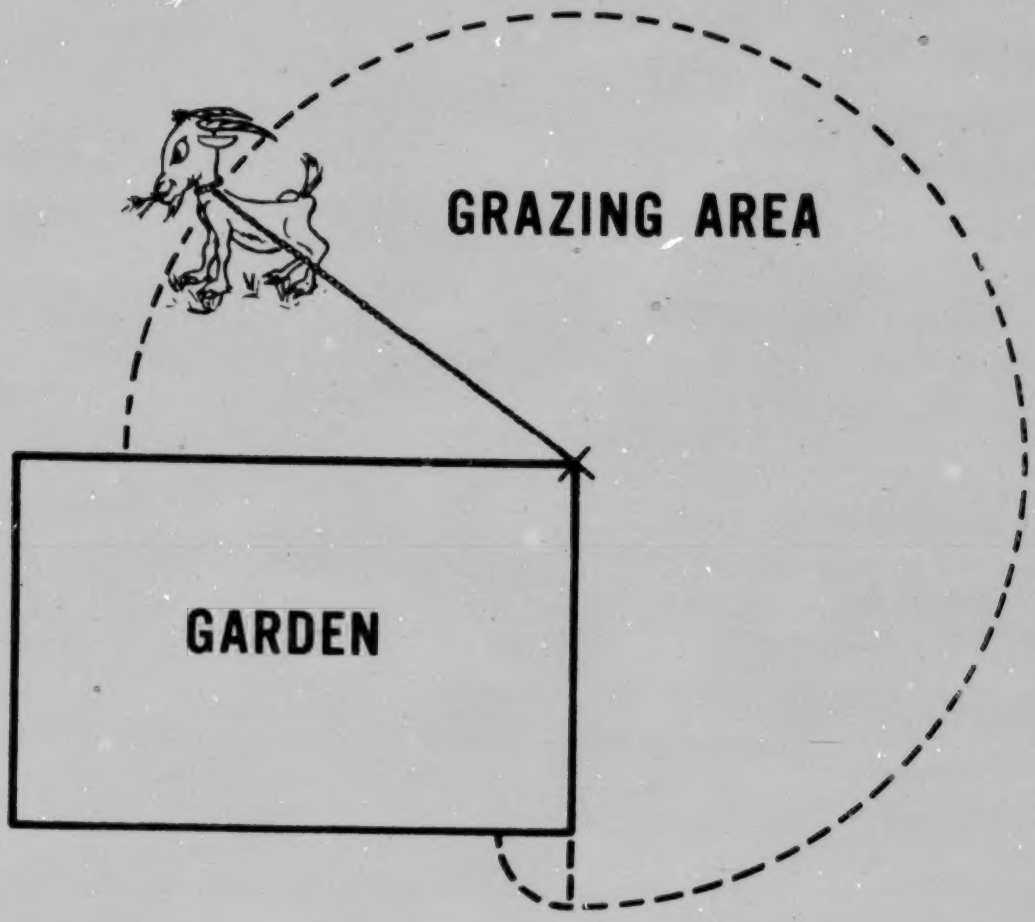
PERIMETER AND AREA PROBLEM:



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CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To discover the occupations which are related to geometry.

SPECIFIC BEHAVIORAL OBJECTIVE: In order to illustrate the relationship of geometry to occupations, each student will list five math related occupations and tell how each involves the use of geometric design.

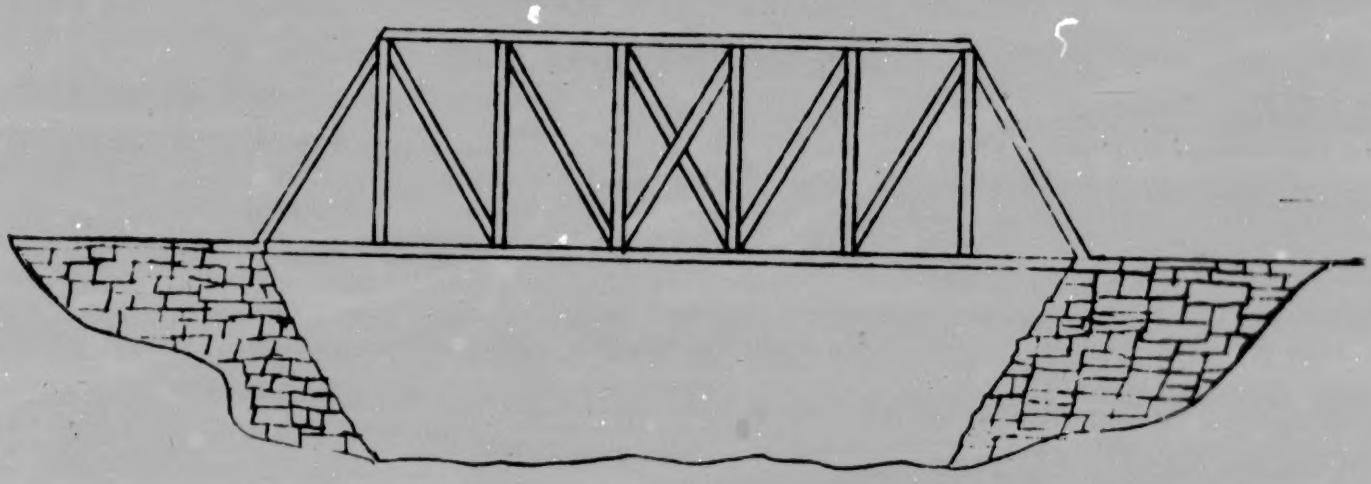
SUGGESTED SUBJECT AREA Mathematics

SUGGESTED GRADE LEVEL Jr. - Sr. High

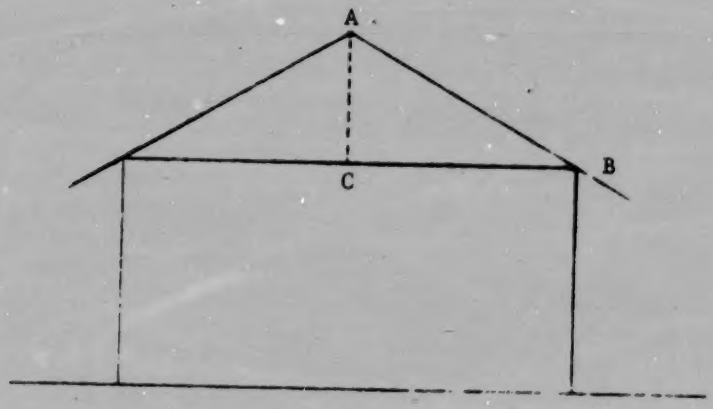
ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Have students write a paragraph describing the work of five to ten math related occupations. Construct a bulletin board depicting the titles of some of the occupations in the reports and add pictures showing their work.	1. Introduce geometry as a course that has numerous implications to nearly any occupation the student may want to pursue. 2. Kickoff can come from textbook that includes any reference to work. 3. On a bulletin board, illustrate with pictures such things as designs, bridges, maps, buildings, blue prints, and artistic pictures based on geometric shapes. 4. Have students make geometric designs: - Straight line designs - pencil string - Polyhedron models, etc.	Occupational Outlook Handbook World Book Encyclopedia Modern Algebra - Structure and Method Houghton-Mifflin Co. - Boston Magazines Finney's Occupational Guidance Kit See attached example

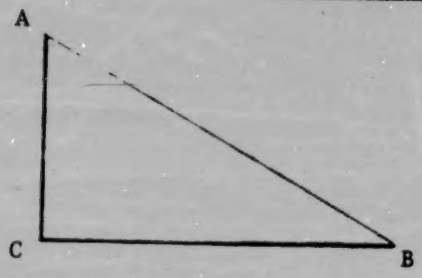
SUGGESTED CORRELATION FOR THIS ACTIVITY:

BRIDGE CONSTRUCTION REQUIRES THE USE OF GEOMETRY



The strength and rigidity of truss construction depends upon triangles.

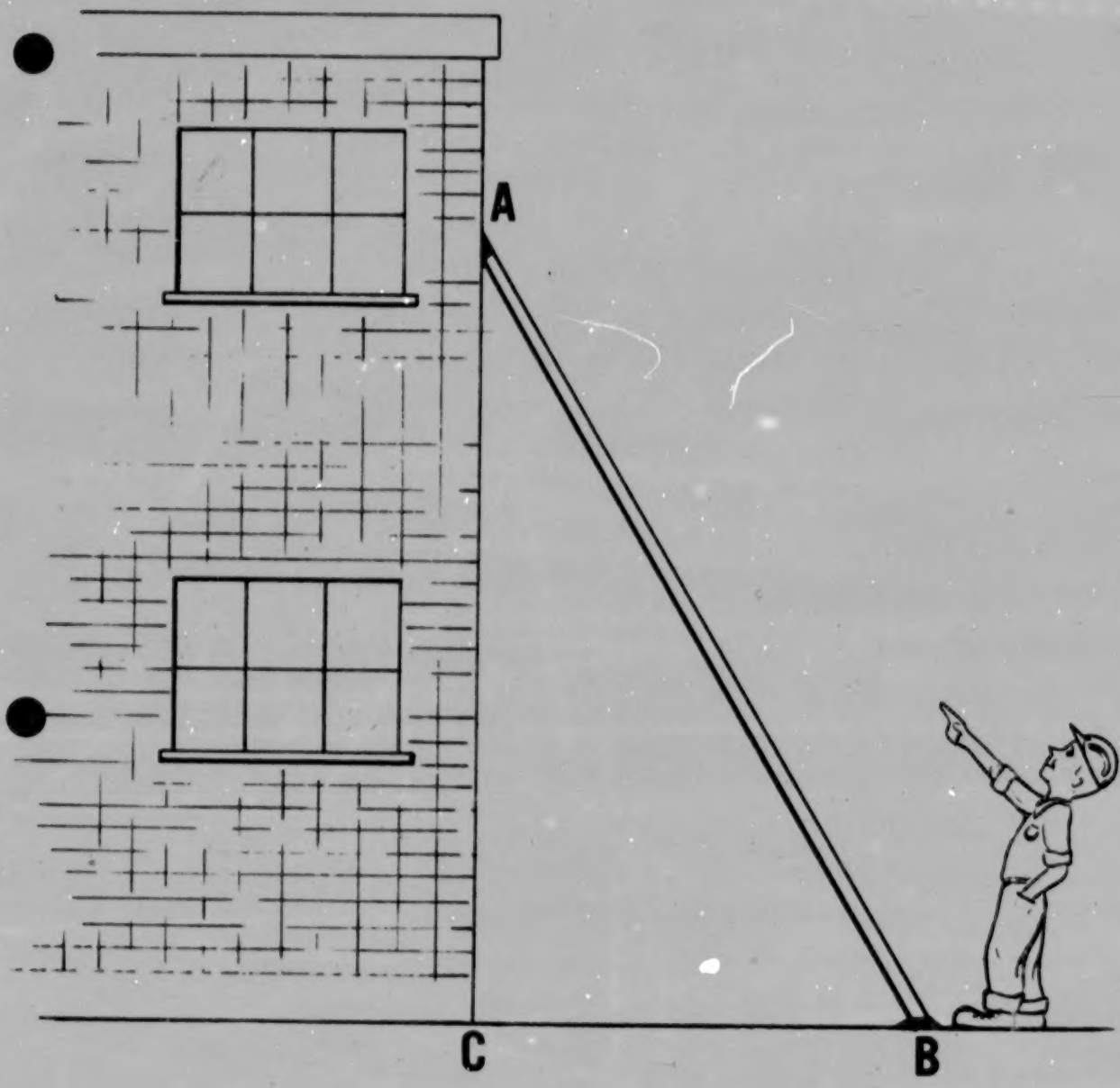




$C^2 = A^2 + B^2$

The piece AB of a roof is called a rafter. How long must AB be made when AC is 6 ft. and BC is 12 ft.?

A CARPENTER APPLIES MATHEMATICS DAILY



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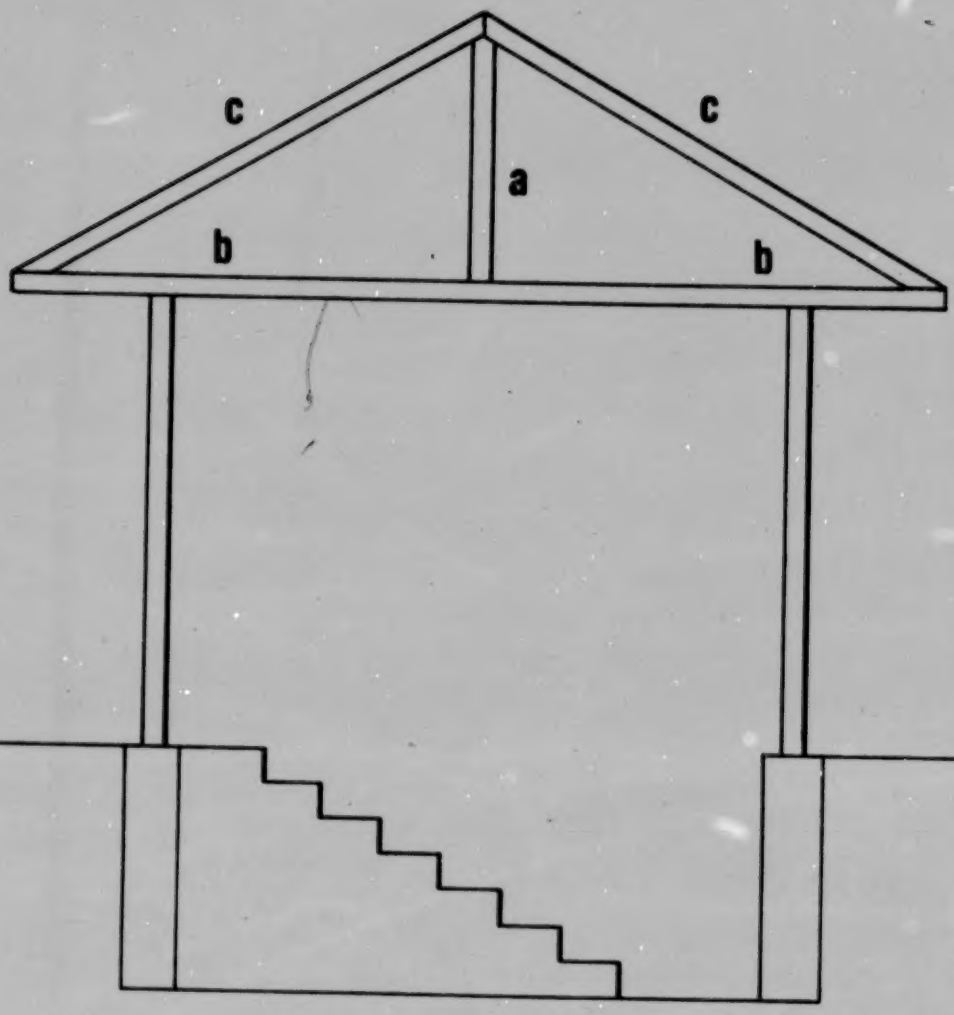

HOW WOULD THE PYTHAGAREAN THEOREM BE USED BY A CARPENTER TO CONSTRUCT THIS STRUCTURE?

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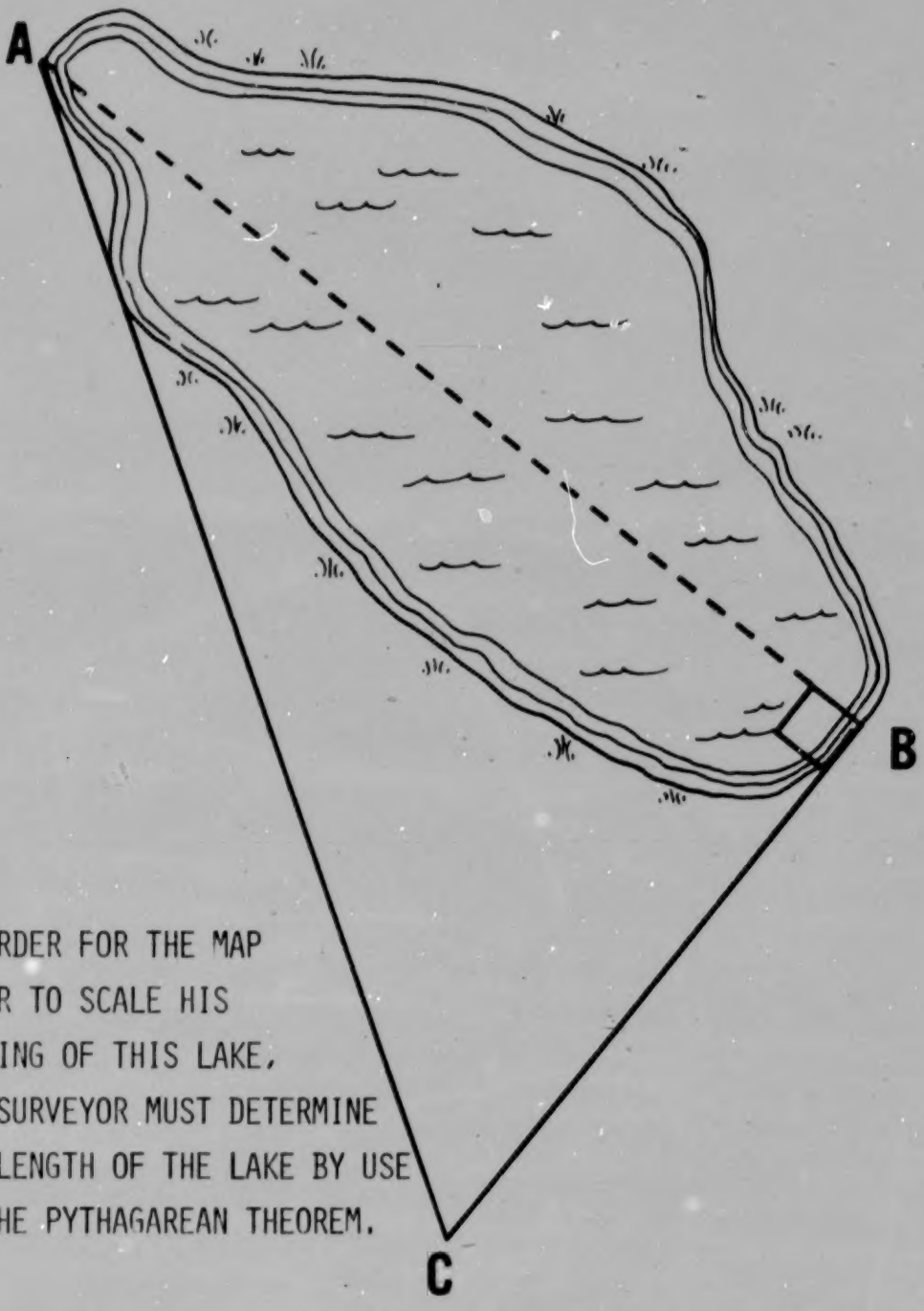

IN ORDER FOR THE MAP MAKER TO SCALE HIS DRAWING OF THIS LAKE, THE SURVEYOR MUST DETERMINE THE LENGTH OF THE LAKE BY USE OF THE PYTHAGAREAN THEOREM.

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CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To introduce students to the type of work done by a tax consultant

SPECIFIC BEHAVIORAL OBJECTIVE: To be able to calculate Federal income tax. (Math Objective - finding a percent of a number.) Given the adjusted income and an income tax table the student will be able to calculate the Federal income tax with 80% accuracy.

SUGGESTED SUBJECT AREA Mathematics

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Calculate the Federal income tax when given the gross income rate of standard deduction and number of exemptions.	Briefly describe how a tax consultant would handle a tax problem in which the following are given: gross income, standard deduction and number of exemptions. Determination of the tax would involve the use of the tax rate schedule. The problem presented should be quite simple in content. This is to become familiar with the procedure in a minimum amount of time.	Publications No. 17, 19 and 21 District Director Internal Revenue Service U. S. Post Office & Federal Office Bldg. Roberts St. & Second Ave. Fargo, ND 58102 Individual Income Tax Return Form 1040 Tax Rate Schedule

SUGGESTED CORRELATION FOR THIS ACTIVITY:

1971 Tax Rate Schedules

If you do not use one of the Tax Tables, figure your tax on the amount on Form 1040, line 50, by using the appropriate Tax Rate Schedule on this page. Enter tax on Form 1040, line 19.

SCHEDULE X—Single Taxpayers Not Qualifying for Rates in Schedule Y or Z

If the amount on Form 1040, line 50, is:			Enter on Form 1040, line 19:
Over—	But not over—		of excess over—
Not over $500		14% of the amount on line 50.	
$500	$1,000	$70+15%	$500
$1,000	$1,500	$145+16%	$1,000
$1,500	$2,000	$225+17%	$1,500
$2,000	$4,000	$310+19%	$2,000
$4,000	$6,000	$690+21%	$4,000
$6,000	$8,000	$1,110+24%	$6,000
$8,000	$10,000	$1,590+25%	$8,000
$10,000	$12,000	$2,090+27%	$10,000
$12,000	$14,000	$2,630+29%	$12,000
$14,000	$16,000	$3,210+31%	$14,000
$16,000	$18,000	$3,830+34%	$16,000
$18,000	$20,000	$4,510+36%	$18,000
$20,000	$22,000	$5,230+38%	$20,000
$22,000	$26,000	$5,990+40%	$22,000
$26,000	$32,000	$7,590+45%	$26,000
$32,000	$38,000	$10,290+50%	$32,000
$38,000	$44,000	$13,290+55%	$38,000
$44,000	$50,000	$16,590+60%	$44,000
$50,000	$60,000	$20,190+62%	$50,000
$60,000	$70,000	$26,390+64%	$60,000
$70,000	$80,000	$32,790+66%	$70,000
$80,000	$90,000	$39,390+68%	$80,000
$90,000	$100,000	$46,190+69%	$90,000
$100,000		$53,090+70%	$100,000

SCHEDULE Y—Married Taxpayers and Certain Widows and Widowers

If you are a married person living apart from your spouse, see page 4 of the instructions in this package to see if you can be considered to be "unmarried" for purposes of using Schedule X or Z.

Married Taxpayers Filing Joint Returns and Certain Widows and Widowers (See page 4)

If the amount on Form 1040, line 50, is:			Enter on Form 1040, line 19:
Over—	But not over—		of excess over—
Not over $1,000		14% of the amount on line 50.	
$1,000	$2,000	$140+15%	$1,000
$2,000	$3,000	$290+16%	$2,000
$3,000	$4,000	$450+17%	$3,000
$4,000	$8,000	$620+19%	$4,000
$8,000	$12,000	$1,380+22%	$8,000
$12,000	$16,000	$2,260+25%	$12,000
$16,000	$20,000	$3,260+28%	$16,000
$20,000	$24,000	$4,380+32%	$20,000
$24,000	$28,000	$5,660+36%	$24,000
$28,000	$32,000	$7,100+39%	$28,000
$32,000	$36,000	$8,660+42%	$32,000
$36,000	$40,000	$10,340+45%	$36,000
$40,000	$44,000	$12,140+48%	$40,000
$44,000	$52,000	$14,060+50%	$44,000
$52,000	$64,000	$18,060+53%	$52,000
$64,000	$76,000	$24,420+55%	$64,000
$76,000	$88,000	$31,020+58%	$76,000
$88,000	$100,000	$37,980+60%	$88,000
$100,000	$120,000	$45,180+62%	$100,000
$120,000	$140,000	$57,580+64%	$120,000
$140,000	$160,000	$70,380+66%	$140,000
$160,000	$180,000	$83,580+68%	$160,000
$180,000	$200,000	$97,180+69%	$180,000
$200,000		$110,980+70%	$200,000

Married Taxpayers Filing Separate Returns

If the amount on Form 1040, line 50, is:			Enter on Form 1040, line 19:
Over—	But not over—		of excess over—
Not over $500		14% of the amount on line 50.	
$500	$1,000	$70+15%	$500
$1,000	$1,500	$145+16%	$1,000
$1,500	$2,000	$225+17%	$1,500
$2,000	$4,000	$310+19%	$2,000
$4,000	$6,000	$690+22%	$4,000
$6,000	$8,000	$1,130+25%	$6,000
$8,000	$10,000	$1,630+28%	$8,000
$10,000	$12,000	$2,190+32%	$10,000
$12,000	$14,000	$2,830+36%	$12,000
$14,000	$16,000	$3,550+39%	$14,000
$16,000	$18,000	$4,330+42%	$16,000
$18,000	$20,000	$5,170+45%	$18,000
$20,000	$22,000	$6,070+48%	$20,000
$22,000	$26,000	$7,030+50%	$22,000
$26,000	$32,000	$9,030+53%	$26,000
$32,000	$38,000	$12,210+55%	$32,000
$38,000	$44,000	$15,510+58%	$38,000
$44,000	$50,000	$18,990+60%	$44,000
$50,000	$60,000	$22,590+61%	$50,000
$60,000	$70,000	$28,790+64%	$60,000
$70,000	$80,000	$35,190+66%	$70,000
$80,000	$90,000	$41,790+68%	$80,000
$90,000	$100,000	$48,590+69%	$90,000
$100,000		$55,490+70%	$100,000

SCHEDULE Z—Unmarried (or legally separated) Taxpayers Who Qualify as Heads of Household (See page 4)

If the amount on Form 1040, line 50, is:			Enter on Form 1040, line 19:
Over—	But not over—		of excess over—
Not over $1,000		14% of the amount on line 50.	
$1,000	$2,000	$140+16%	$1,000
$2,000	$4,000	$300+18%	$2,000
$4,000	$6,000	$660+19%	$4,000
$6,000	$8,000	$1,040+22%	$6,000
$8,000	$10,000	$1,480+23%	$8,000
$10,000	$12,000	$1,940+25%	$10,000
$12,000	$14,000	$2,440+27%	$12,000
$14,000	$16,000	$2,980+28%	$14,000
$16,000	$18,000	$3,540+31%	$16,000
$18,000	$20,000	$4,160+32%	$18,000
$20,000	$22,000	$4,800+35%	$20,000
$22,000	$24,000	$5,500+36%	$22,000
$24,000	$26,000	$6,220+38%	$24,000
$26,000	$28,000	$6,980+41%	$26,000
$28,000	$32,000	$7,800+42%	$28,000
$32,000	$36,000	$9,480+45%	$32,000
$36,000	$38,000	$11,280+48%	$36,000
$38,000	$40,000	$12,240+51%	$38,000
$40,000	$44,000	$13,260+52%	$40,000
$44,000	$50,000	$15,340+55%	$44,000
$50,000	$52,000	$18,640+56%	$50,000
$52,000	$64,000	$19,760+58%	$52,000
$64,000	$70,000	$26,720+59%	$64,000
$70,000	$76,000	$30,260+61%	$70,000
$76,000	$80,000	$33,920+62%	$76,000
$80,000	$86,000	$36,400+63%	$80,000
$86,000	$100,000	$41,440+64%	$86,000
$100,000	$120,000	$49,120+66%	$100,000
$120,000	$140,000	$62,320+67%	$120,000
$140,000	$160,000	$75,720+68%	$140,000
$160,000	$180,000	$89,320+69%	$160,000
$180,000		$103,120+70%	$180,000

ANSWERS TO SAMPLE PROBLEMS

1.	Adjusted gross income	$10,500
2.	Standard Deduction (13% of Adjusted gross income, maximum - $1,500)	1,365
3.	Subtract line 2 from Line 1	9,135
4.	Multiply number of exemption by $675 (Assume 4 in Family)	3,375
5.	Taxable income - subtract line 4 from line 3	5,760
6.	Tax - use tax rate schedule (use married, filing jointly)	620 + .19 (5760 - 4000)= $ 954.40

Additional Problems

1. Adjusted gross income - $10,200; Married, filing jointly; 3 in family, Tax - $1,161.31

2. Adjusted gross income - $14,725; married, filing jointly; 2 in family, Tax - $2,232.50

(The problems illustrated are quite similar in content, this is to allow students to become familiar with the procedure in a minimum amount of time.)

PART IV.—Tax Computation (Do not use this part if you use Tax Tables 1–13 to find your tax.)

46	Adjusted gross income (from line 18)	46	
47	(a) If you itemize deductions, enter total from Schedule A, line 32 and attach Schedule A (b) If you do not itemize deductions, and line 46 is: (1) $10,000 or more but less than $11,538.43, enter 13% of line 46 (2) $11,538.43 or more, enter $1,500. **Note:** deduction under (1) or (2) is limited to $750 if married and filing separately.	47	
48	Subtract line 47 from line 46	48	
49	Multiply total number of exemptions claimed on line 11, by $675	49	
50	**Taxable income.** Subtract line 49 from line 48 ▶	50	

(Figure your tax on the amount on line 50 by using Tax Rate Schedule X, Y or Z, or if applicable, the alternative tax from Schedule D, income averaging from Schedule G, or maximum tax from Form 4726.) Enter tax on line 19.

SAMPLE PROBLEM

1. Adjusted gross income $10,500

2. Standard Deduction (13% of adjusted gross income, maximum - $1500)

3. Subtract Line 2 from Line 1

4. Multiply number of exemptions by $675 (Assume 4 in family)

5. Taxable income - subtract Line 4 from Line 3

6. Tax - Use tax rate schedule (use married filing jointly)

Additional Problems

1. Adjusted gross income - $10,200; married, filing jointly; 3 in family.

2. Adjusted gross income - $14725; married, filing jointly; 2 in family.

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To acquaint students with employment trends and outlooks.

SPECIFIC BEHAVIORAL OBJECTIVE: After completion of this activity, the students will be able to collect and organize statistical data and present it in graph form.

SUGGESTED SUBJECT AREA Math

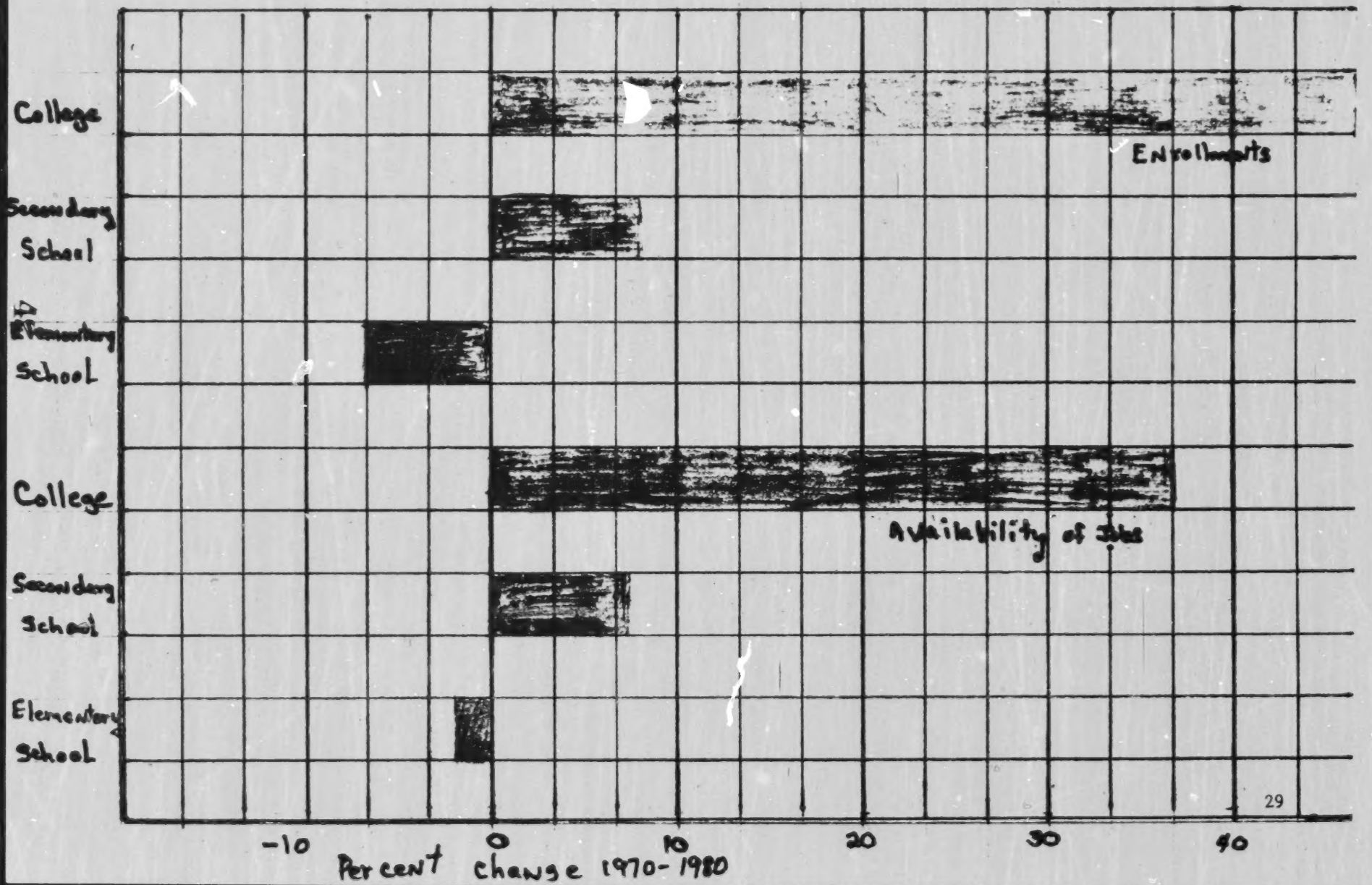
SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Have students make a bulletin board, using line or bar graphs showing the availability of jobs in relationship to amount of education and/or training they might need.	Have the students collect and organize data on the availability of jobs in different occupations and the amount of education and/or training needed. Have them put their statistics together and make a bar or line graph showing the availability of job in relationship to the amount of education and/or training needed.	Occupational Outlook Handbook U. S. Department of Labor Occupations and Careers by N. Feingold and Sol Swerdloft McGraw-Hill Book Company

SUGGESTED CORRELATION FOR THIS ACTIVITY: Use with unit on statistics.

GROWTH IN AVAILABILITY OF JOBS FOR TEACHERS IS CLOSELY RELATED TO STUDENT ENROLLMENT PATTERNS

Sample Graph



CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To acquaint students with practical applications of mathematics to surveying.

SPECIFIC BEHAVIORAL OBJECTIVE: After completion of this activity, the students will be able to explain in writing two uses of math to a surveyor.

SUGGESTED SUBJECT AREA Mathematics

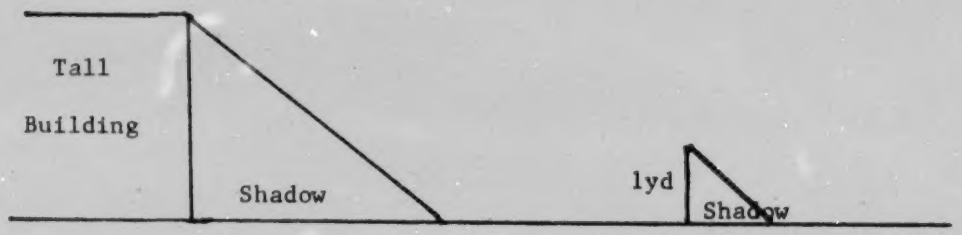
SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Take the math class outside and discuss how to measure heights of tall buildings and distances across a lake or river.	1. With the use of a yard stick the height of a tall building can be calculated. Comparing the shadow of a building and the shadow of a yard stick the height of the building can be calculated. 2. With a related procedure the distance across a lake or river could be calculated.	Textbook Attached sheet

SUGGESTED CORRELATION FOR THIS ACTIVITY:

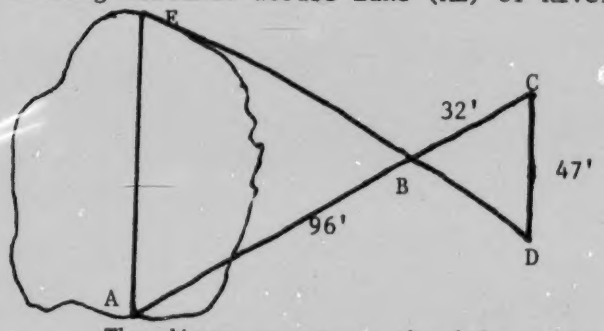
Attachment for Mathematics activity on triangles:

1. Finding height of building:



$$\frac{\text{Yard stick}}{\text{Shadow of yard stick}} = \frac{\text{Height of Building}}{\text{Shadow of Building}}$$

2. Finding distance across Lake (AE) or River:



1. Put stakes at A, B, C, D, E with AE parallel CD.
2. Suppose AB= 96'
   BC= 32'
   CD= 47'

The distance across the lake could be found by:

$$\frac{AE}{47'} = \frac{96'}{32'}$$

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To acquaint the students with the need for mathematics in architecture.

SPECIFIC BEHAVIORAL OBJECTIVE: Each student will illustrate in his own manner the need for mathematics in the field of architecture.

SUGGESTED SUBJECT AREA Math

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Show and discuss a set of slides on "Mathematics in Architecture." In case slides aren't available a resource person can be used. Resource person should discuss how he uses math for his work. Have a question and answer period involving resource person.	1. Discuss with the students architecture in general. a. What does architecture mean? b. Who or what is an architect? c. Amount of schooling needed to become an architect. d. Amount of mathematics an architect needs. 2. Show the slides with the commentary. 3. Discuss the slides, putting special emphasis on the need of mathematics in architecture.	Slides: "Mathematics in Architecture" J. Weston Walch, Publisher Box 658 Portland, Maine 04104 Local architect.

SUGGESTED CORRELATION FOR THIS ACTIVITY:

45

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To acquaint the students with the relationship of mathematics of solids to several occupations.

SPECIFIC BEHAVIORAL OBJECTIVE: After viewing the filmstrips and discussing solids in general, the students will demonstrate understanding of the relationship of solids to occupations by listing six occupations related to this area of math.

SUGGESTED SUBJECT AREA Math

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Filmstrip and discussion.	1. Discuss with the students solids in general. a. volumes of cube, prism, cylinder, pyramid, cone and sphere. b. surface area of solids in general with special emphasis on cubes, prisms, pyramids, cylidners, cones, and spheres. 2. Show the filmstrip (the application of this knowledge to occupations is indicated in the filmstrips). 3. Discuss the filmstrips and the application of this knowledge to occupations. 4. For an evaluation, the teacher could have each student list six occupations related to this area of math.	Filmstrip: "Discovering Solids" #118-M, Imperial Film Co.

SUGGESTED CORRELATION FOR THIS ACTIVITY:

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To acquaint students with the composition of occupational families.

SPECIFIC BEHAVIORAL OBJECTIVE: After acquainting the student with the distribution of employed persons according to occupational families, each student will accurately construct a circle graph depicting this distribution.

SUGGESTED SUBJECT AREA Mathematics

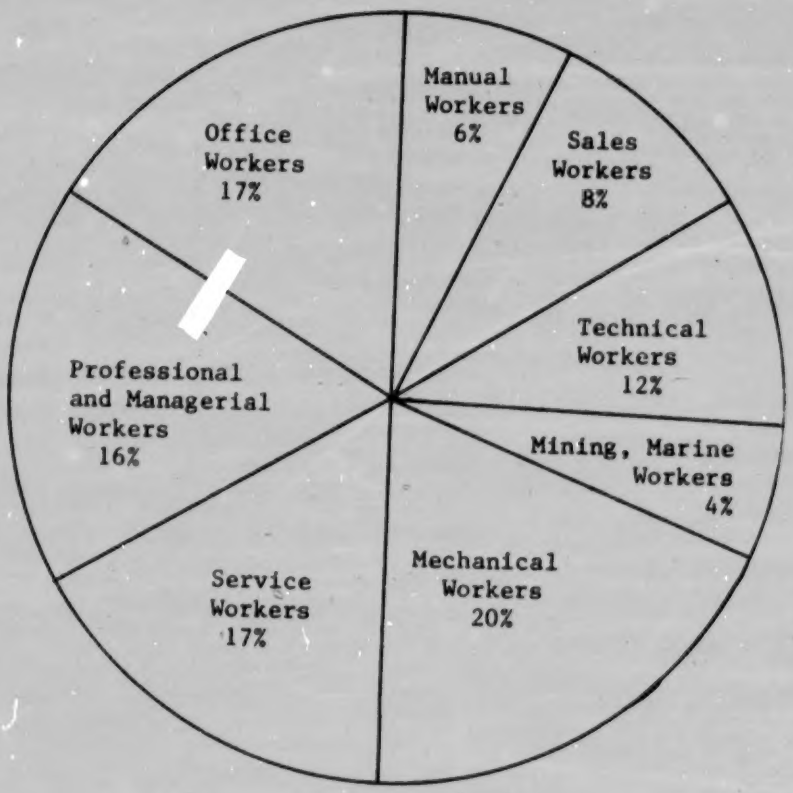
SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
While learning to make circle graphs, students will become aware of the distribution of employed persons according to occupational families and how this can ultimately affect their career choice.	1. List on the board the occupational families as they appear in the circle graph and explain the kind of work involved in each area. 2. Give students the percentage of the total work force in each family. 3. Have students construct a circle graph depicting this distribution of employed persons. 4. Discuss how this knowledge may affect a person's choice of an occupation.	Enclosed Circle Graph Occupational Outlook Handbook Dictionary of Occupational Titles "Exploring the World of Jobs" # 5-1082 SRA Guidance Series

SUGGESTED CORRELATION FOR THIS ACTIVITY:

DISTRIBUTION OF EMPLOYED PERSONS

ACCORDING TO OCCUPATIONAL FAMILIES



CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To acquaint the students with the application of Mathematics in several occupational areas.

SPECIFIC BEHAVIORAL OBJECTIVE: To be able to solve the occupation-related problems enumerated in the cross-number puzzle. (Math objective - to be able to handle fractions, decimals, percents, measures and formulas.)

SUGGESTED SUBJECT AREA Mathematics

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Complete the "Occupational Cross-number" puzzle. A related activity would be to have the students make up their own job-related problems and build their own cross-number puzzles. This is much more difficult than working a cross-number puzzle prepared by someone,	This cross-number could be utilized as a review of fractions, decimals, percents measures and formulas, topics usually covered in 7th and 8th grade mathematics. The instructor might point out what will become quite obvious as the students work on the puzzle, namely, the broad applicability of mathematics to a multiplicity of jobs. As to the mechanics of the puzzle itself, some of the horizontal problems have mixed decimals as answers. The students should insert the decimals but then ignore them when they work the vertical problems. This also works the other way. If particular units of measurement are used in going one direction, they should be ignored in going the other direction. A mixed fraction, such as $1\frac{1}{4}$, requires 2 squares.	Credit should be given to the two excellent mathematics texts which served as a source for many of the cross-number problems. Modern Applied Mathematics, by Gold and Carlberg, Houghton Mifflin, Publishers. Vocational and Technical Mathematics in Action by Samuel Levine; Hayden books Co., Publisher A publication which gives some suggestions for constructing cross-number puzzles is A Collection of Cross-Number Puzzles by Louis Grant Brandes; J. Weston Walch, Publisher

SUGGESTED CORRELATION FOR THIS ACTIVITY:

HORIZONTAL

1. A payroll clerk is determining the time worked for an employee who put in 9½ hours a day for 24 days. What were the total hours worked by the employee?

4. A painter is going to paint the outside of a school. If a gollon of paint covers 600 square feet and the outside area of the school is 7,800 square feet, how many gallons of paint will be needed?

6. A carpenter is dividing a board which is 13feet 4inches long into 8 parts of equal length. What will be the length of each part? Express your answer in feet and inches. (Disregard the saw cuts.)

7. A cabinet maker uses 12 bd. ft. (board feet) of birch at $.72 per bd. ft. and 6 bd. ft. of ash at $.51 per bd. ft. What is the total cost of the wood?

9. A loan officer in a bank makes a loan of $3,625 at 8% to a client, the loan to be repaid in two years. What interest will the client owe when the two years are up?

11. An architect is designing a home. What would be the pitch of the roof if the span is 16 feet and the rise is 4 feet (pitch = $\frac{\text{rise}}{\text{span}}$)

12. An electrical engineer determines that a transmission line loses 1.3 kilowatts in transmitting 65 kilowatts. What is the percent of loss?

13. A plumber lays a drain pipe on a slope of 0.12 in. for each ft. of length of pipe. What is the total drop in the pipe in a distance of 50 ft.?

14. An investment counselor is advising a client. At what rate of interest must the client invest $1,000 for 6 months if he wants the return on his investment to amount to $25?

15. A parking lot developer is planning a parking space 180' by 120'. If he allows 100 sq. ft. for each car, how many cars will the lot hold?

17. A plumber needs the following lengths of pipe: 12'8", 10'7", 40' 5", 9' 2" and 74' 11". What is the total length of pipe needed? Express your answer in feet and inches.

20. A telephone line installer places his poles 96' apart. How many poles will he need for one mile of line?

21. An electrical engineer is working with a motor which runs on a 220-volt line and takes 30 amperes. What is the horsepower of the motor? Round your answer to the nearest tenth. (MP =(VxA) ÷ 746.

22. A sales manager is selling a radio regularly priced at $10.95 at 20% off. What is the sales price?

VERTICAL

1. A payroll clerk is calculating an employee's social security withholding. If the social security rate is 6% and the employee's earnings are $358.66, what is the withholding? Round your answer to the nearest cent.

2. An electrician is installing a neon sign which uses 4½ watts of electricity for each foot of tubing. How many watts will be used if the sign if 64 ft. long?

4. A draftsman is drawing an object which is made up of segments of the following lengths: 3 9/16", 1 3/4", 6 3/16" and 5½". What is the total length of the object? Express your answer in feet.

5. A carpenter buys 300 bd. ft. of lumber and uses 90% of it on a particular job. How many bd. ft. of the lumber were left over?

8. An electrician is examining an electric current. Find the amperage of the current if the pressure is 120 volts and the resistance is 96 ohms. Express your answer as a mixed fraction. ($I = \frac{E}{R}$; I = amperes, E = volts, R = ohms)

10. An excavator is preparing to dig a basement. How many cubic feet of dirt can be taken from a hole in the ground which is 42' long by 15' wide by 9' deep?

13. A telephone lineman is cutting a 333' 6" length of line from a 1000' coil of line. What length of line will remain? Express your answer in ft.and in..

15. A fry cook has learned that it takes 2 min. to boil an egg. How many minutes will it take to boil 6 eggs?

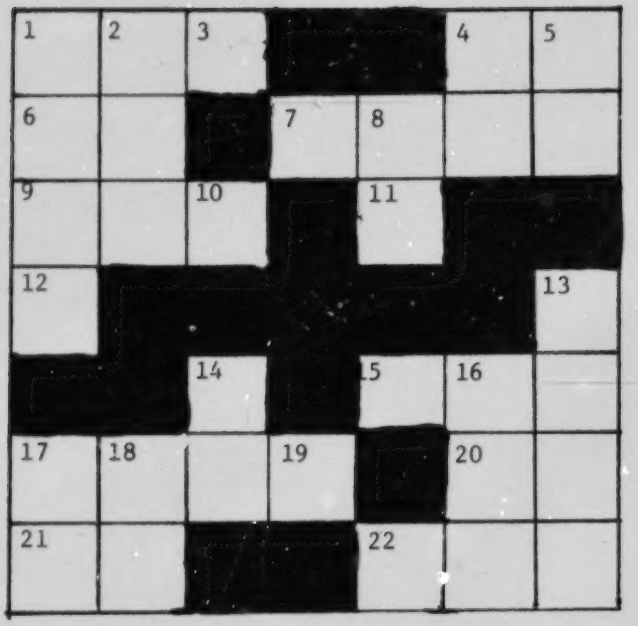
14. A mathematics teacher is working on this problem: Find X if 50 x 60, and one of the factors of x is 19.

16. An electrical engineer is pricing cable which costs $.225 per ft. What will be the approximate cost of 697 ft. of this cable? Round your answer to the nearest collar.

17. An electrician is installing lamps on a circuit which is fused for 15 amperes. If each lamp takes 5/6 amp., how many lamps may be safely placed on the circuit?

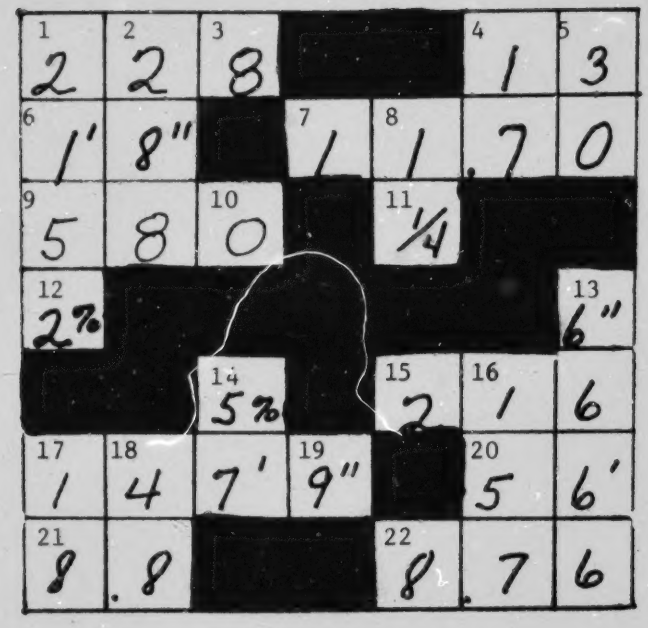
18. A building contractor is pouring a strip of sidewalk 27' long, 6' wide and 6" thick. If concrete costs $16 per cubic yard, what will be the total cost of the concrete?

"OCCUPATIONAL CROSS-NUMBER"



Note: Nos. 10 and 15 vertical, are "nonsense" problems.
BE CAREFUL!

"OCCUPATIONAL CROSS-NUMBER"



CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To make students aware of occupational trends by making bar graphs and broken line graphs.

SPECIFIC BEHAVIORAL OBJECTIVE: To demonstrate a knowledge of graphing, each student will construct two graphs, read them, and answer all questions in the technique section.

SUGGESTED SUBJECT AREA Mathematics

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
In working on graph construction, have students graph the occupational trends in terms of the goods producing occupations and the service producing occupations.	For suggested technique, see attached.	Occupational Outlook Handbook

SUGGESTED CORRELATION FOR THIS ACTIVITY:

Graphs

1. Make a bar graph to show the following facts for "Where People Work" (1968)

Area	No. of Workers
Manufacturing	19 million
Trade	13 million
Government	12 million
Services	10.5 million
Transportation and Public Utilities	4.5 million
Agriculture	4 million
Finance, Insurance and Real Estate	3.5 million
Contract Construction	3 million
Mining	1 million

2. Industries providing services offer more jobs than those providing goods. Make a broken-line graph for the following information. Note: Graph both I and II on the same graph so a comparison can be made.

I.

	1947	1950	1953	1956	1959	1962	1965	1968
Number of workers in "Goods Producing Occupations"	27 million	26 million	27 million	27 million	25 million	25 million	26 million	27 million

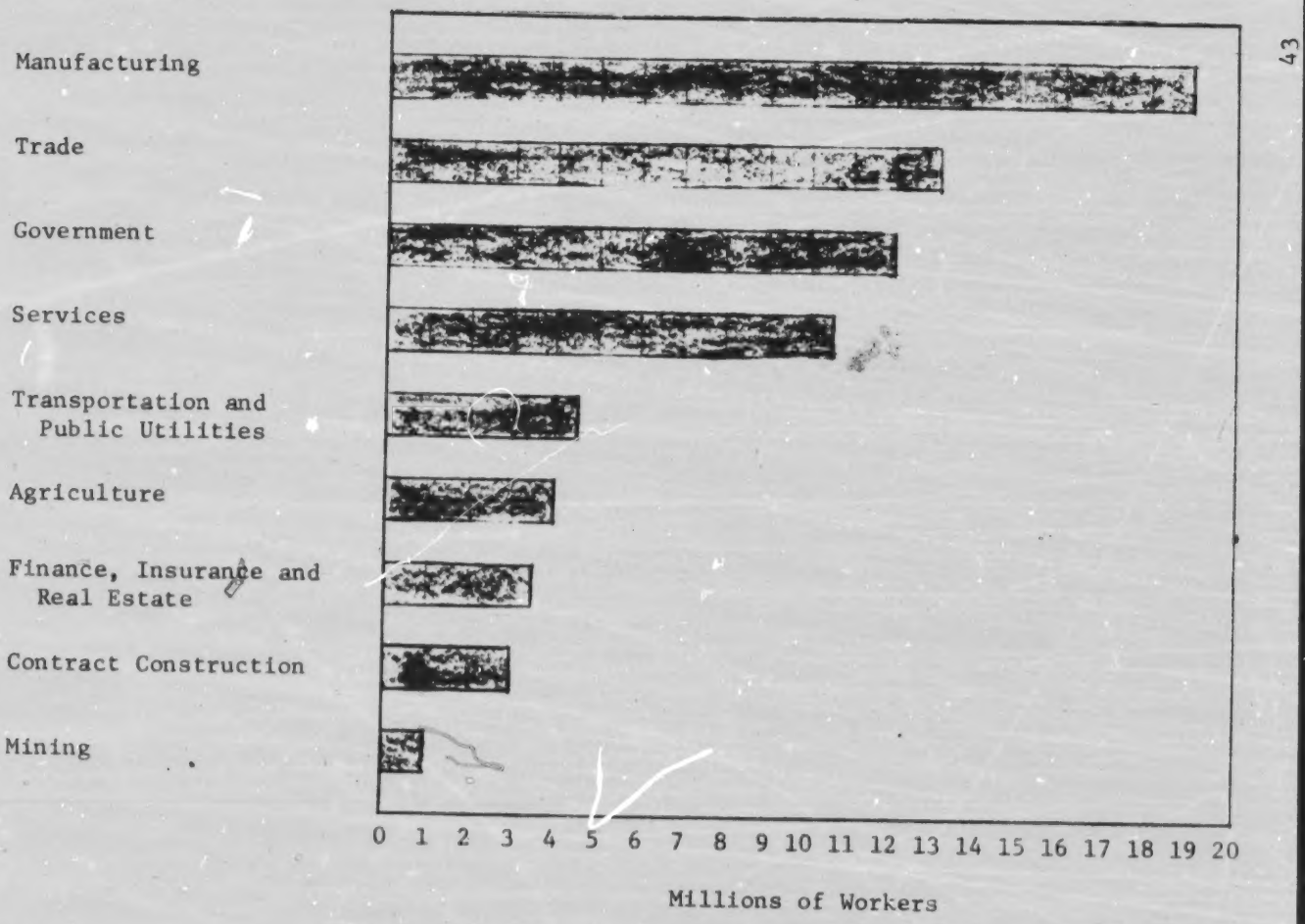
II.

Number of workers in "Service Producing Occupations"	25 million	26 million	28 million	31 million	33 million	35 million	39 million	35 million

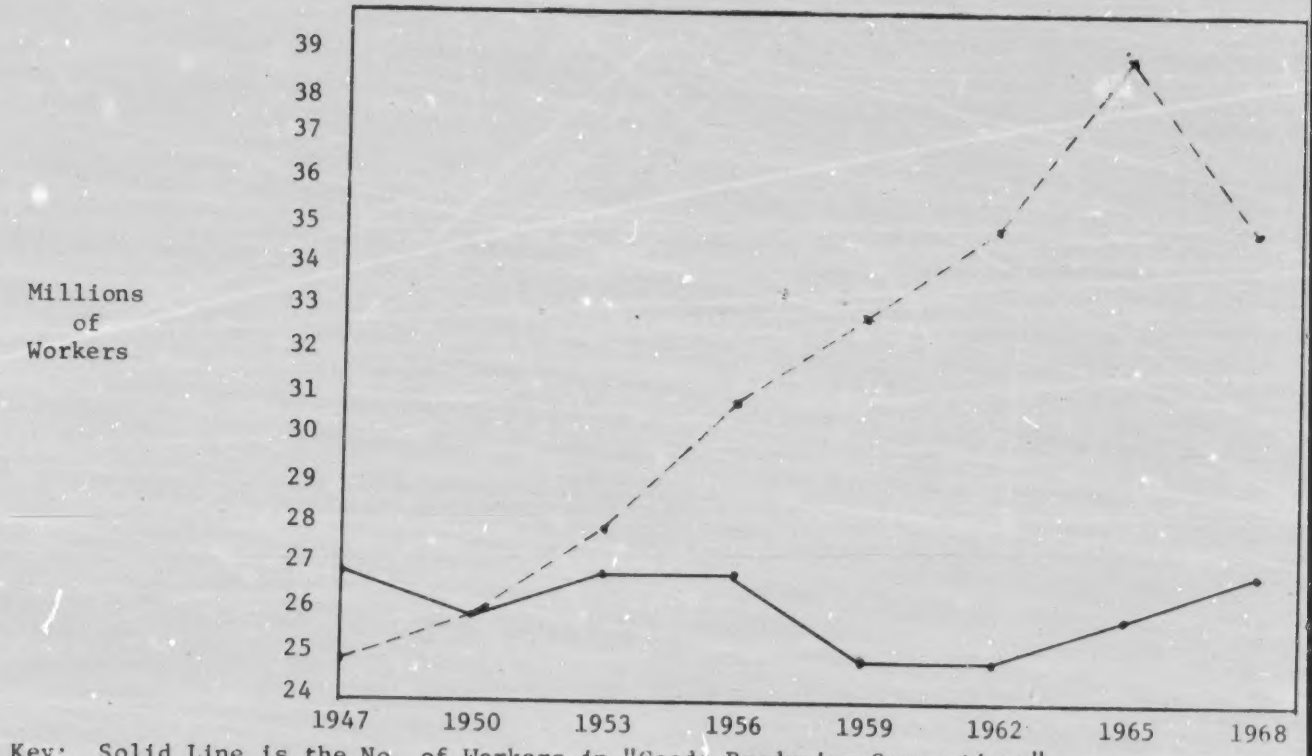
3. Note: "Goods Producing Occupations" include: Manufacturing, Contract Construction, Mining and Agriculture. "Service Producing Occupations" include: Transportation and Public Utilities, Trade, Finance, Insurance and Real Estate, Services, Government.

4. From your graph answer the following questions:
   A. Describe the change in the number of workers in the "Goods Producing Occupations from 1947 to 1968.
   B. Describe the change in the number of workers in the "Service Producing Occupations from 1947 to 1968.
   C. For 1968, compare the number of workers in the two groups. (Which one is larger and by how many?)

1. Bar Graph



2. Line Graphs



Key: Solid Line is the No. of Workers in "Goods Producing Occupations"
Dashed Line is the No. of Workers in "Service Producing Occupations"

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To show how people use percentages in various occupations

SPECIFIC BEHAVIORAL OBJECTIVE: After demonstrating a knowledge of solving practical problems doing percentages, each student will list at least three occupations that use percentages and indicate how percentages are used in those occupations.

SUGGESTED SUBJECT AREA Mathematics

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Students, in learning to work practical problems using percentages will become acquainted with the everyday uses of percentages.	1. Have students work some textbook problems using percentages. 2. Go through other examples with students. a. Store clerks (sales tax discounts) b. Real estate agent (commission etc.) 3. Using the newspaper ads, have each student pick three available jobs that would use percentages. 4. For each occupation chosen have the students briefly explain and illustrate how percentages are used in these jobs.	Textbooks Newspaper Ads

SUGGESTED CORRELATION FOR THIS ACTIVITY:

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To show the relationship of Mathematics to map reading.

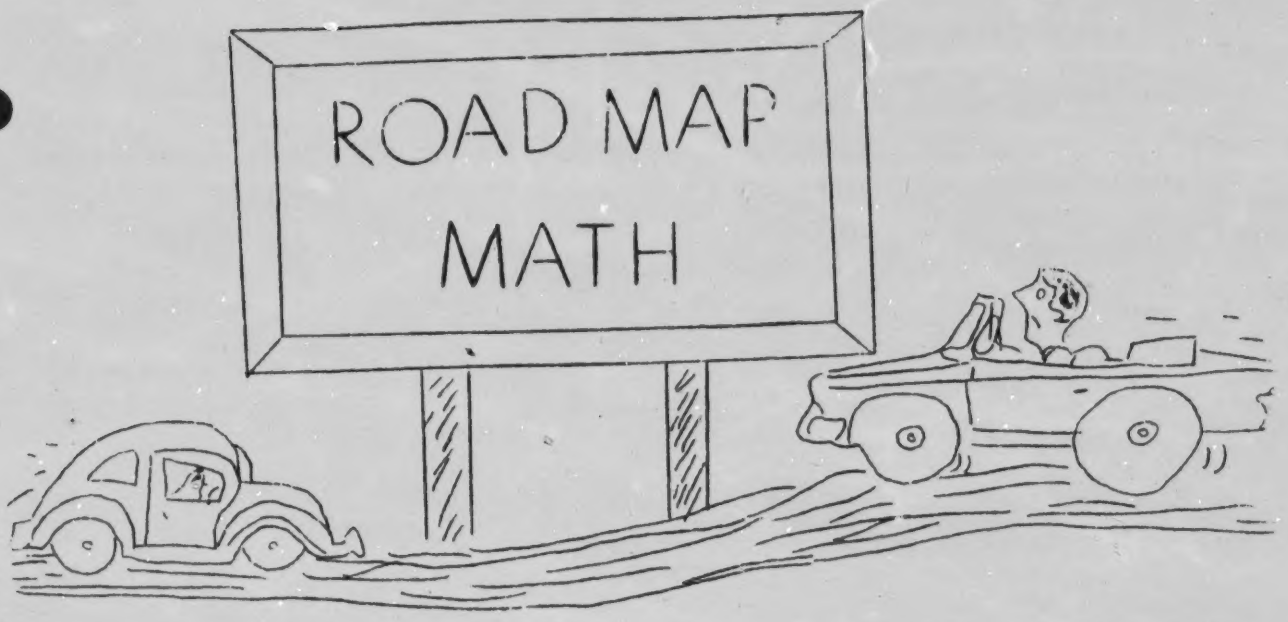
SPECIFIC BEHAVIORAL OBJECTIVE: Each student will be provided with the opportunity to discover procedures for problem solving and answering questions by doing the various worksheets and will gain an understanding of how mathematics is related to maps and mapreading.

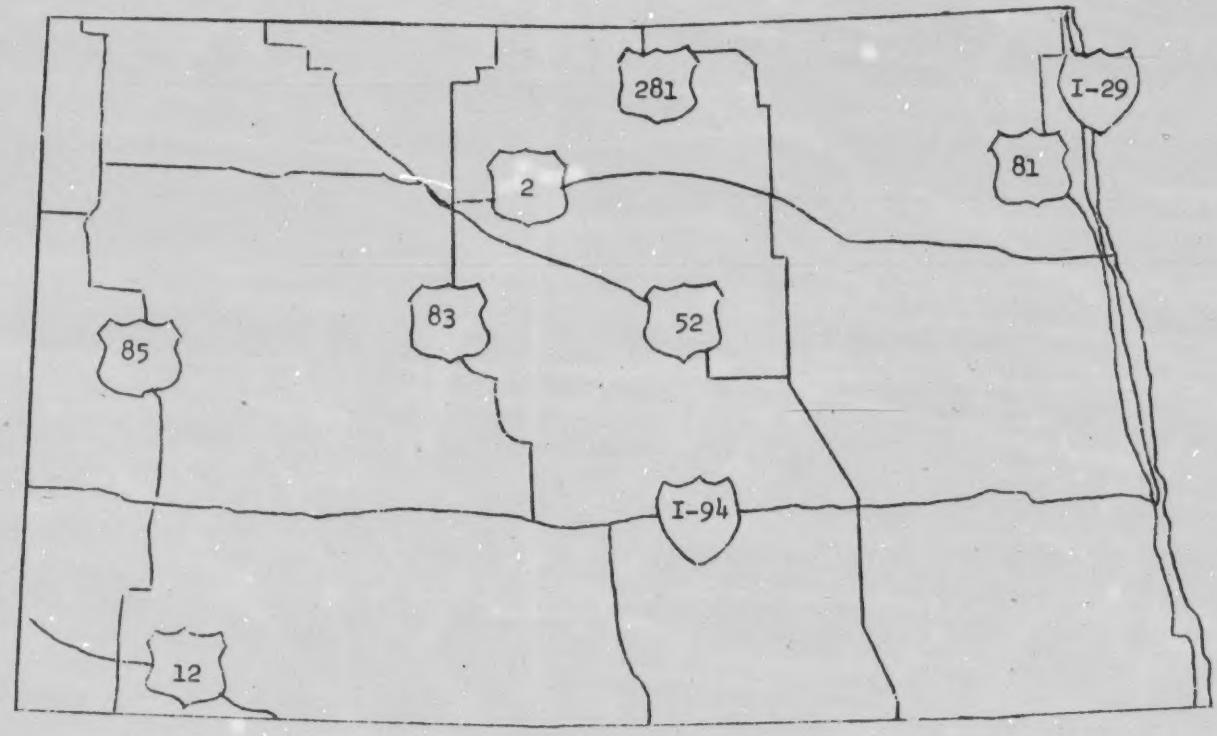
SUGGESTED SUBJECT AREA Math

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Go through the different parts of a map with the students. Have the students do the various worksheets, illustrating the different Math concepts being used.	1. Discuss maps in general with emphasis on North Dakota official highway map. a. How to open and close the map. b. One inch equals how many miles. c. How to read population charts. d. How to compute mileage between cities. e. How to identify state parks and National Parks. f. How to use distance table (mileage log) g. The meaning of various road signs. h. How to identify the different types of road surfaces. i. How to locate the different cities. 2. Have students complete the various worksheets.	1. Official highway map of North Dakota. Travel Division, Highway Dept. Bismarck, ND 58501 <u>Road Map Math</u> George Fors, Department of Public Instruction

SUGGESTED CORRELATION FOR THIS ACTIVITY:





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1972

BUY NORTH DAKOTA PRODUCTS

INTRODUCTION

This unit is an outgrowth of a similar unit which was prepared in the State of Iowa by the Central Iowa Low-Achiever Mathematics Project. The material has been adapted to the North Dakota raod map. The target population for this unit is seventh and eighth grade mathematics or the ninth grade general mathematics class. It would also fit very well into a social studies unit on North Dakota starting as early as grade four.

PURPOSE OF UNIT

Many elementary teachers throughout the State of North Dakota are doing some type of road map geography in connection with the unit of study of North Dakota in the upper elementary grades. We hope that this unit will provide a direction for teachers and students and that it will be of value to them as they plan the year's work.

There is a definite emphasis throughout education tending toward the integration of the various disciplines. This unit is designed to help do that for mathematics and social studies.

OBJECTIVES

We believe that a good use of this unit will result in the attainment of the following objectives:

1. Students will gain some knowledge of North Dakota geography, particularly in the location of towns and cities.
2. Students will be provided the opportunity to discover procedures for problem solving and answering questions.
3. Discussions of social studies topics will follow the activities in the unit.
4. Arithmetic drill and practice will be done by the student.

SUGGESTIONS FOR USE

Some of the material may become uninteresting for a few students in the class. It is very important for the teacher to realize this. In order to guard against this, all of the students should not be required to do all the arithmetic problems on each one of the pages.

It might be well when considering the implementation of this unit that the teacher give some thought to spreading the work throughout the whole study of North Dakota rather than concentrating in it for a short period of time. That is, it may be more effective if it is interwoven into the curriculum, rather than inserted as a unit.

This unit of study was designed to be used in conjunction with the official highway map from the State of North Dakota. Many of the questions are answerable only by using this map. Write to the Travel Division, Highway Department, Bismarck, ND. 58501, they may have maps for the class. There is a real incentive to students if each one is provided with his own map.

The first order of business in introducing the unit might be directions on how to open and close the road map. A procedure like that might even result in a generation of contented automobile drivers.

The student pages which accompany this teacher's guide can be reproduced in any form by the local teacher. As with the maps themselves, each student should be provided with his own worksheet.

USING THE LEGEND OF THE MAP

DIRECTIONS: Answer the following questions using the information on the map to help you.

1. One inch on the map equals approximately _____ miles.

2. How many traffic interchanges are there on Interstate 94 between the west border and the east border of North Dakota? _____

3. How many U. S. highways pass over Interstate 94 from Dickinson to Valley City?_____

4. Forty-eight miles is represented by _____ inches on the map.

5. Name the counties that are adjacent and touch the county you live in and list the county seat.

   1)_____ 4)_____

   2)_____ 5)_____

   3)_____ 6)_____

6. Look at the map and find out how to identify state parks and then name four of them.

   1)_____ 3)_____

   2)_____ 4)_____

7. Name four Indian Reservations:

   1)_____ 3)_____

   2)_____ 4)_____

8. What is the speed limit for cars on Interstate 94? Day_____ Night_____

9. What is the speed limit for trucks on Interstate 94? Day_____ Night_____

10. The speed limit on State highways is posted but the maximum is usually _____ miles per hour.

11. What telephone number would you call to reach the North Dakota Highway Patrol in an emergency?_____

12. What was the population of North Dakota in the 1970 census?_____

13. In what time zone is North Dakota?_____

14. Name the railroad which passes through Bismarck?_____

15. U. S. and Interstate highways running north-south are numbered differently than those running east-west. What is this difference?_____

_____.

USING THE POPULATION CHART ON THE MAP

DIRECTIONS: Look up the following cities or towns on the population chart and write the population, first in numerals then in words.

1. Alice _____
2. Bismarck _____
3. Carpio _____
4. Devils Lake _____
5. Edmore _____
6. Fargo _____
7. Gilby _____
8. Hankinson _____
9. Jamestown _____
10. Kief _____
11. Lidgerwood _____
12. Marion _____
13. New England _____
14. Overly _____
15. Portland _____
16. Rugby _____
17. Sawyer _____
18. Tioga _____
19. Williston _____
20. Zap _____

50

USING THE DISTANCE TABLE
(Mileage Log)

DIRECTIONS: Find the distance table on the front of the map and use it to find the distance between the following pairs of cities.

CITIES	MILES
1. Bismarck to Grand Forks	_____
2. Amidon to Ellendale	_____
3. Fargo to Grafton	_____
4. Lakota to McClusky	_____
5. Lisbon to Cavalier	_____
6. New Rockford to Bowman	_____
7. Steele to Mandan	_____
8. Valley City to Carson	_____
9. Wahpeton to Crosby	_____
10. Medora to Linton	_____
11. Williston to Beach	_____
12. Ashley to Devils Lake	_____
13. Beach to Rolla	_____
14. Bottineau to Center	_____
15. Cando to Jamestown	_____
16. Carrington to Minot	_____
17. Cooperstown to Napoleon	_____
18. Dickinson to Minnewaukan	_____
19. Fessenden to Fort Yates	_____
20. Finley to Langdon	_____
21. Forman to Mott	_____
22. Hettinger to Mohall	_____
23. Rugby to Hillsboro	_____
24. Manning to LaMoure	_____

25. What two cities listed in the chart on the map are the furthest apart?

_____ and _____, _____ miles.

HIGHWAYS

DIRECTIONS: Using the index to towns, find the following towns and cities and locate them on the map. List the highway which goes through or near these towns.

	TOWN	HIGHWAYS
1.	Crosby	
2.	Selfridge	
3.	Hazen	
4.	Towner	
5.	Tuttle	
6.	Milnor	
7.	Page	
8.	Esmond	
9.	Hoople	
10.	Neche	
11.	Maddock	
12.	Sharon	
13.	Watford City	
14.	Grenora	
15.	Ashley	

MORE FROM THE MAP

DIRECTIONS: Answer the following questions using the map, its legend, and other charts and tables.

1. Name all the States and Canadian Provinces which border North Dakota.

   1)_____ 2)_____

   3)_____ 4)_____ 5)_____

2. What kind of road surface is there between Regent and Gladstone?

   _____

3. What is the approximate distance across North Dakota from west to east?_____

4. What is the approximate distance from north to south?_____

5. What is the area of North Dakota?_____

6. What lake has been formed as a result of the Garrison Dam?_____

7. About how many miles of interstate highways are there in North Dakota? (94 and 29)_____

8. What historic site is at or near Killdeer?_____
   Rhame_____

9. A National park found in North Dakota is called _____ and is located_____.

10. Name two North Dakota cities that have military airports near them.
    1)_____ 2)_____

11. Name five cities that have a commercial airport. 1)_____
    2)_____ 3)_____
    4)_____ 5)_____

12. What is the population density for North Dakota? (Population divided by area in square miles)_____. The United States average is about 57 people per square mile.

Name the rivers or streams that pass through or near the following cities.

1. Fairmount_____
2. Washburn_____
3. Marmarth_____
4. Cavalier_____
5. Kathryn_____
6. Wing_____

FIGURING MILEAGE

DIRECTIONS: Given below are the names of two towns, and following is the highway route we are to use to get from one town to the other. With this information, add up all the distances between the towns to arrive at the correct mileage between them. (Note that this does not include the distances through the towns on the way.)

	TOWNS	HIGHWAYS	DISTANCE
1.	Jamestown to Cooperstown	94 and 1	_____
2.	Wahpeton to Lisbon	13 and 32	_____
3.	Wishek to Ellendale	3 and 11	_____
4.	Reeder to Mott	22 and 21	_____
5.	Dickinson to Halliday	22 and 200	_____
6.	New Town to Minot	23 and 83	_____
7.	Tioga to Williston	40, 2 and 85	_____
8.	Stanley to Kenmare	8, 50 and 52	_____
9.	Velva to Towner	52 and 14	_____
10.	Drake to New Rockford	52 and 15	_____
11.	Devils Lake to Nekoma	20, 17 and 1	_____
12.	Lakota to Walhalla	1, 5 and 32	_____
13.	Minto to Hatton	81, 15 and 18	_____
14.	Pillsbury to Fargo	32 and 94	_____
15.	Verona to Hurdsfield	13, 281, 94 and 3	_____

POPULATIONS

DIRECTIONS: Without using the index to towns, find the approximate populations of the following places, and answer with one of the following letters.

A. 10,000 or more
B. 5,000 to 10,000
C. 1,000 to 5,000
D. 500 to 1,000
E. 0 to 500

In the other column write the name of the county where the town is located.

	TOWN	LOCATION	COUNTY	POPULATION
1.	Mandan	L-11	_____	_____
2.	Almont	L-9	_____	_____
3.	Turtle Lake	H-11	_____	_____
4.	Enderlin	L-21	_____	_____
5.	Minot	E-10	_____	_____
6.	Valley City	K-20	_____	_____
7.	Anamoose	G-13	_____	_____
8.	Dunseith	C-14	_____	_____
9.	Watford City	G-4	_____	_____
10.	Grafton	D-22	_____	_____
11.	Oakes	O-20	_____	_____
12.	Elgin	M-8	_____	_____
13.	Portal	B-6	_____	_____
14.	Westhope	B-11	_____	_____
15.	Wahpeton	N 25	_____	_____

WHICH TOWN IS LARGER?

DIRECTIONS: Using your map population chart find out which town is the larger of the two.

	TOWNS	LARGER TOWN
1.	Abercrombie or Larimore	_____
2.	Belcourt or Max	_____
3.	Burlington or Munich	_____
4.	Cogswell or Parshall	_____
5.	Donnybrook or Robinson	_____
6.	Flasher or Tower City	_____
7.	Hannaford or Zeeland	_____
8.	Karlsruhe or Michigan	_____
9.	Northwood or Park River	_____
10.	Bowbells or Palermo	_____

HOW MUCH LARGER?

DIRECTIONS: Using your map population chart find out how much larger the first town is than the second.

	TOWNS	DIFFERENCE
1.	Adams, Leonard	_____
2.	Belfield, Wyndmere	_____
3.	Casselton, Underwood	_____
4.	Drayton, St. Thomas	_____
5.	Edgeley, Kay	_____
6.	Garrison, Sherwood	_____
7.	Hazelton, Lansford	_____
8.	Grand Forks, Bismarck	_____
9.	Hebron, Richardton	_____
10.	Kindred, Medina	_____
11.	West Fargo, Mayville	_____
12.	Alexander, Milton	_____
13.	Berthold, Petersburg	_____
14.	Glenburn, Tolna	_____
15.	Beulah, Osnabrock	_____

ARRANGING IN ORDER

List the 15 largest cities in North Dakota in order according to population.

1) _____ 6) _____ 11) _____

2) _____ 7) _____ 12) _____

3) _____ 8) _____ 13) _____

4) _____ 9) _____ 14) _____

5) _____ 10) _____ 15) _____

Arrange the following cities from smallest to largest in population.

Alamo	Dawson	Gardner	White Earth
Balta	Emerado	Hamilton	Wales
Calvin	Forbes	Kramer	South Heart

1) _____ 5) _____ 9) _____

2) _____ 6) _____ 10) _____

3) _____ 7) _____ 11) _____

4) _____ 8) _____ 12) _____

Arrange the following cities from largest to smallest in population

Wilton	Rolette	Columbus	Killdeer
Strasburg	Mapleton	Gackle	Kulm
Stanton	Arthur	Gwinner	Noonan

1) _____ 5) _____ 9) _____

2) _____ 6) _____ 10) _____

3) _____ 7) _____ 11) _____

4) _____ 8) _____ 12) _____

Give the letter of the number which comes the closest to the actual population of the following cities.

A	50
B	100
C	150
D	200
E	250
F	300
G	350

Alsen _____	Binford _____	Edinburg _____
Arnegard _____	Buffalo _____	Fingal _____
Ambrose _____	Antler _____	Souris _____
Bantry _____	Berlin _____	Tappen _____
Amenia _____	Cleveland _____	Tolley _____

ODOMETER READINGS

The first number listed below is your odometer reading from a given point in the United States; the second number is your odometer reading at the end of the trip.

PROBLEM: Find the number of miles traveled on each trip.

	BEGINNING LOCATION	READING	END LOCATION	READING	MILES TRAVELED
1.	Cheyenne, WY	14061.4	Little Rock, AR	15116.7	_____
2.	Houston, TX	7877.7	Billings, MT	9496.5	_____
3.	Cleveland, OH	74210.9	Duluth, MN	75055.2	_____
4.	Fargo, ND	13644.3	San Antonio, TX	15032.1	_____
5.	Los Angeles, CA	6321.9	Indianapolis, IN	8417.0	_____
6.	Rockford, IL	44632.8	St. Joseph, MO	45104.6	_____
7.	Jacksonville, FL	51006.7	Pierre, SD	52780.1	_____
8.	Knoxville, TN	64335.5	Salt Lake City, UT	66276.2	_____
9.	Pittsburgh, PA	26627.9	Davenport, IA	27265.0	_____
10.	Washington, DC	12621.4	Milwaukee, WI	13407.6	_____

TRAVEL ON THE JOB

Given below is the number of miles different salesmen turned in to their company for travel on the job. If the company allows them nine cents per mile, what payment will each of the following men receive? Round your amount to the nearest cent.

	SALESMAN	MILEAGE	AMOUNT OF PAYMENT
1.	Mr. F. Belkner	671.7	_____
2.	Mr. J. Gould	1048.9	_____
3.	Mr. W. Wilsman	1337.1	_____
4.	Mr. R. Reed	1475.2	_____
5.	Mr. G. Compton	922.4	_____
6.	Mr. F. Gordon	686.7	_____
7.	Mr. R. Gatson	611.0	_____
8.	Mr. A. Logan	1777.2	_____
9.	Mr. M. Reams	547.0	_____
10.	Mr. V. Bogan	1125.5	_____

ROUTE SALESMEN

DIRECTIONS: If these men earn a salary of $160.00 a week and are allowed a $15.00 lodging allowance per night and $10.00 per day for meals and other expenses, what will each receive in salary and expenses if he is on the road for 5 days and 4 nights. (To teacher--The amount paid for miles traveled on preceeding pages could also be added)

SALESMAN	AMOUNT RECEIVED	SALESMAN	AMOUNT RECEIVED
1. Mr. F. Belkner	_____	6. Mr. F. Cordon	_____
2. Mr. J. Gould	_____	7. Mr. R. Gatson	_____
3. Mr. W. Wilsman	_____	8. Mr. A. Logan	_____
4. Mr. R. Reed	_____	9. Mr. M. Reams	_____
5. Mr. G. Compton	_____	10. Mr. V. Bogan	_____

DIRECTIONS. Using the information below, first estimate just to see how close you can really come to the right answer, THEN find the distance chart on your map and write in the correct distance in the DISTANCE column, then figure the other two columns.

Miles Per Hour: 58

Miles Per Gallon: 18

Cost Per Gallon: 36.9¢

ESTIMATE

CITIES	DISTANCE	TIME	COST
1. Ashley to Bowman	_____	_____	_____
2. Bowbells to Ellendale	_____	_____	_____
3. Fessenden to Jamestown	_____	_____	_____
4. Langdon to Rolla	_____	_____	_____

ACTUAL

1. Ashley to Bowman	_____	_____	_____
2. Bowbells to Ellendale	_____	_____	_____
3. Fessenden to Jamestown	_____	_____	_____
4. Langdon to Rolla	_____	_____	_____

PLAN A TRIP

1. Plan a trip from Woodworth to Medora to Williston and return to Woodworth. List all highways, stops, places of interest for both going and returning.

2. What would be the distance traveled?_____

3. What would be the cost for gas if your car averages 15 miles per gallon and gasoline costs 40.9¢ per gallon?_____

4. How long will the trip take? (Include time for stops, food, gas, sightseeing, etc.)

5. If our government planned to build a new experimental city of one hundred thousand people, where should it be located? Why? This city should not be located near any of the present large cities in North Dakota.

6. If you had the chance, what changes would you make in the road map you have been using in order to make it easier and better to use? Why?

ANSWER THE FOLLOWING

1. What is the North Dakota state flower?_____

2. What is the North Dakota state bird?_____

3. What is the North Dakota state tree?_____

4. What is the North Dakota state fossil?_____

WHAT IS THE AVERAGE?

DIRECTIONS: Find the average population of the following towns and cities and write the average in the blank.

1. Aneta
   Argusville
   Buxton
   Courtney
   Crystal
   Fordville
   Granville
   Hunter
   Willow City
   _____

2. Wildrose
   Upham
   Thompson
   Scranton
   _____

3. St. John
   Rock Lake
   Powers Lake
   New Salem
   McVille
   _____

SIGNS

Traffic signs speak a special kind of language to the driver. Serious accidents occur when drivers disregard signs, signals and markings placed to help the driver. Signs help you by:

--Warning of hazards ahead that would otherwise be difficult to see;
--Guiding drivers to their destinations by identifying the route;
--Informing drivers of local regulations; and
--Regulating the speed and movement of traffic.

You should know these signs by their shapes.

EQUILATERAL TRIANGLE:
Exclusively for Yield Signs.

DIAMOND:
Exclusively to warn of existing or possible hazards on roadways or adjacent areas.

VERTICAL RECTANGLE:
Generally for regulatory signs.

HORIZONTAL RECTANGLE:
Generally for guide signs.

OCTAGON:
Exclusively for Stop signs.

ROUND:
Railroad crossing signs.

PENNANT:
Advance warning of No Passing Zones.

PENTAGON:
School advance and school crossing signs.

BICYCLE RULES

A bicyclist is neither a pedestrian nor a motorist, but he is subject to traffic regulations.

1. Keep to the right.
2. Ride single file.
3. Obey all traffic regulations.
4. Have a headlight and taillight or reflector.
5. Use hand signals when turning or stopping.
6. Give pedestrians the right-of-way.
7. Don't ride without brakes.
8. Walk your bicycle across busy intersections.
9. Don't weave in and out of traffic.
10. Use a basket or tiedown when carrying packages.

EXERCISE IN BICYCLE SAFETY

True-False:

	True	False
1. A bicycle is considered a vehicle and is subject to all the laws governing automobile traffic.	____	____
2. When passing a slow moving car ahead going in the same direction, you should pass to the left of the car in front.	____	____
3. Pedestrians have the right of way at all times when crossing in a roadway even in the middle of a block.	____	____
4. It is desirable to ride at least three feet away when passing parked cars.	____	____
5. It is safe to ride bicycles three abreast when riding in a group.	____	____
6. Hitch-hiking or holding on to moving vehicles is safe if the rider is watchful.	____	____
7. The headlight of a bicycle should be seen from a distance of 500 feet.	____	____
8. On a country highway, cyclists should keep to the left side of the road the same as pedestrians.	____	____
9. Night riding without a front light and a red rear reflector is unsafe.	____	____
10. Proper hand signals should be given continuously 100 feet before making a turn.	____	____
11. Pedestrians should walk on the left side of the road facing traffic if there is no sidewalk.	____	____
12. A bicycle in poor condition is safe if the rider is skilled.	____	____
13. Bicycles should be "walked" across heavily traveled intersections.	____	____
14. It is legal for two people to ride on a bicycle which is designed for one person	____	____

Matching:

Match the selections on the left with the illustrations and place the letter corresponding to the correct selection in the answer blank.

Selections

A. Slow or stop signal
B. Warning sign
C. Yellow, caution
D. Stop sign
E. Left turn signal
F. Railroad crossing sign
G. Route marker sign
H. Red, stop
I. Yield sign
J. Right turn signal
K. Regulatory sign
L. Green, go

15.____

16.____

17.____

18.____

19.____

20.____

21.____

22.____

23.____

24.____

25.____

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To acquaint the student with the need for Mathematics in the trucking business.

SPECIFIC BEHAVIORAL OBJECTIVE: After completion of this activity, the student will be able to compute the expenses involved in a trucking business.

SUGGESTED SUBJECT AREA Math

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
The use of Mathematics in the trucking business. Have the students figure out mileage, hours, number of items delivered, cost of items, personal expense account, and amount and cost of gas or diesel fuel, between Bismarck, North Dakota and Helena, Mont.	1. Discuss the need for Math in relationship to A. figure mileage B. Hours driven C. number of items delivered D. Cost of items E. Personal expense account 1. food 2. lodging (if needed) F. Amount of fuel used G. Cost of fuel used L. Fuel Mileage 2. Example: Have the students figure out from Bismarck to Helena and return, the mileage, hours driven, personal expense at $9.00 a day for food and $7.00 for room, total amount of fuel used and total cost of fuel. The driver can only drive 10 hours a day, his average speed is 55-60 MPH, fuel costs him 29.9¢ per gallon, he averages 10.1 miles per gallon in the mountains and 13.5 miles per gallon elsewhere.	Maps A. North Dakota B. Montana

SUGGESTED CORRELATION FOR THIS ACTIVITY:

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To acquaint the student with the use of mathematics in the field of airline dispatching.

SPECIFIC BEHAVIORAL OBJECTIVE: After completion of this activity, the student will be able to list five ways mathematics is used in the airline dispatching field.

SUGGESTED SUBJECT AREA Mathematics

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Have a speaker come in and discuss the use of mathematics in the field of airline dispatching.	1. Discuss airline dispatchers in general A. What they do: 1. Coordinate flight schedules 2. Flight and safety regulations 3. He works with pilot in computing quantity of fuel needed, the best route and altitude, total flying time and alternate fields that may be used if landing at scheduled airport is hazardous. Also responsible for keeping records and checking matters such as the availability of aircraft and equipment, the weight and balance of loaded cargo, amount of time flown by each aircraft and the number of hours flown by each crew member based at his station. 2. During the interview have the dispatcher show the necessity of mathematics in his field. If he isn't available, use video tape or tape recorder and interview him. Stress the use of mathematics in his job.	Person in the field of airline dispatching.

SUGGESTED CORRELATION FOR THIS ACTIVITY:

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To acquaint the students with the various uses of mathematics in owning and operating a small business.

SPECIFIC BEHAVIORAL OBJECTIVE: After the speaker and the interview the students will determine in writing the selling price of our model business.

SUGGESTED SUBJECT AREA Math

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Have the students check into the idea of starting a small business, say gardening. Have them interview someone in this business, finding out overhead costs, profit and loss, and selling price. Putting emphasis on the need of Mathematics.	1. Introduce by discussing Math in small business. 2. Have speaker come in and tell about, 1. Overhead cost a. Lights and heat b. Phone c. Cost of materials d. Other costs *3. Have students interview someone in this field. 4. Have the students set up model business, determining selling price, from overhead and profit and cost. (Could be bulletin board)	1. Any person employed in the small business field 2. Algebra Ginn Co. 3. Mathematics for Daily Living McCormick - Mathers Co.

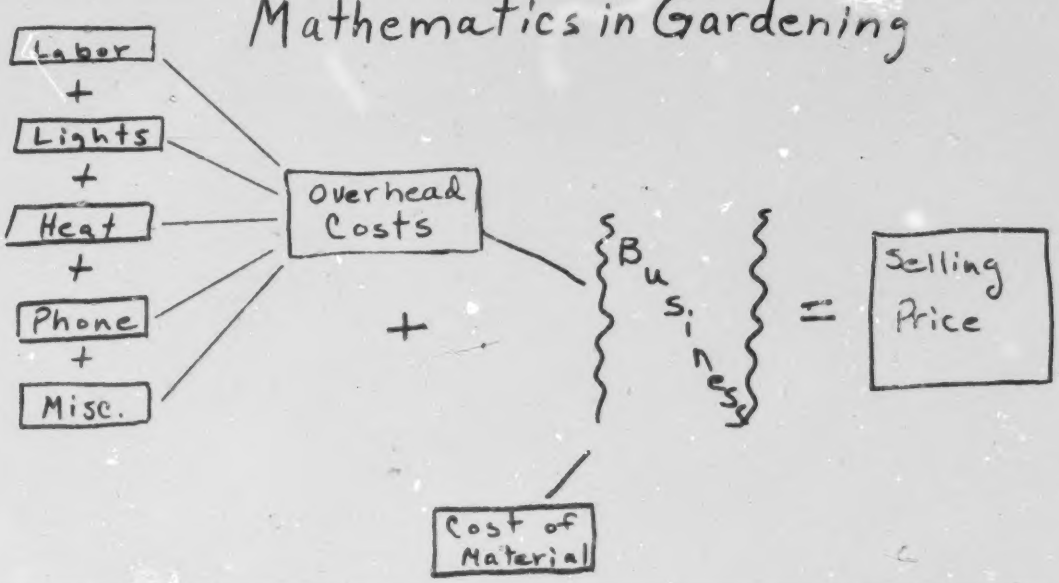
SUGGESTED CORRELATION FOR THIS ACTIVITY:

* The interview should contain these points

1. Name of person interviewed
2. Type of Business
3. Education and/or Training
4. Discuss the use of Mathematics in this job.

Margin = profit + overhead Cost + margin = selling price

Bulletin board idea



CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To introduce the students to the type of mathematics utilized by a person involved in retailing.

SPECIFIC BEHAVIORAL OBJECTIVE: After completion of this activity, the student, given the cost and percent of profit will be able to calculate the selling price of a piece of merchandise.

SUGGESTED SUBJECT AREA Mathematics

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
When given the cost of an item and the desired per cent of markup, calculate the proper selling price. A variation on this would be to have the students note the selling prices of three items being sold in some store, or stores, in North Dakota and, assuming a markup of 40% to determine the cost and markup on each item.	Suggest to the students that they imagine themselves responsible for a retail store. They have decided that the markup on their merchandise is to be 40% of the selling price. That means the cost has to be 60% of the selling price. So if they are marking, for example, a bicycle which cost $30, the problem becomes: $30 is 60% of x. If the students are familiar with proportions, the following can be used: $\frac{30}{x} = \frac{60}{100}$ $60x - 3000$ $x = \$50$ If the students have had some experience with equations, another method would be: $30 = .60x$ $\$50 = x$ Many students, when told that the per cent of markup is to be 40% and the cost of an item is $30, would take 40% of $30 and	Starting and Managing a Small Business of Your Own, The Starting and Management Series, Vol. 1, 2nd Edition; Small Business Administration Washington, DC A Handbook of Small Business Finance, Small Business Management Series No. 15, 7th Edition. Small Business Administration. Guide for Profit Planning, Small Business Management Series #25; Small Business Administration.

SUGGESTED CORRELATION FOR THIS ACTIVITY:

CONTINUATION ACTIVITY SHEET

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
	add that to $30, getting $42. This is basing the per cent of markup on the cost, which is an outmoded method of determining the selling price. Distribute the worksheets and let the students have a go at coming up with some selling prices. An important consideration here is to have the students check their answers. Referring to the original problem, is the markup, $20, 40% of the selling price, $50?	

PROBLEMS

Markup of 40%

	Cost	Selling Price (nearest cent, if necessary)
1.	$12.00	$20
2.	$150.00	$250
3.	$8.50	$14.17

Markup of 35%

	Cost	Selling Price (nearest cent, if necessary)
1.	$26.00	$40
2.	$292.50	$450
3.	$11.50	$17.69

PROBLEMS

Markup of 40%

	Cost	Selling Price (nearest cent, if necessary)
1.	$12.00	
2.	$150.00	
3.	$8.50	

Markup of 35%

	Cost	Selling Price (nearest cent, if necessary)
1.	$26.00	
2.	$292.50	
3.	$11.50	

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To show a relationship between school subjects and opportunities that exist throughout life.

SPECIFIC BEHAVIORAL OBJECTIVE: Each student will demonstrate a knowledge of the relationship of mathematics to building a tool cabinet by finding total cost of their project.

SUGGESTED SUBJECT AREA Math and Industrial Art

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Have the students figure out the cost of building and painting a cabinet for the tools in their garage. Put emphasis on finding board feet, cost per board ft., cost of paint, and total cost.	1. Have students figure out the dimensions they will use. Find the number of board feet they need. Formulas for board feet: N = board feet a. N = thickness in inches x width in ft. x length in ft. divided by 12 $\frac{T.W.L}{12}$ If length is in inches, then divide length by 12. b. $N = \frac{T.W.L}{12 \cdot 12}$ Have them obtain from lumber company cost per board ft. of their lumber and cost of paint. Have them then find total cost of lumber, total cost of paint, and total cost of making the cabinet.	1. Material list from local lumber company. 2. Paint list from local paint store. 3. Woodworking for Industry, Bennett Co. Aeoria, Illinois

SUGGESTED CORRELATION FOR THIS ACTIVITY:

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To acquaint the student with the use of Mathematics in Home Economics.

SPECIFIC BEHAVIORAL OBJECTIVE: To acquaint the student with use of mathematics in Home Economics by having each student figure out in writing the number of pleats, space between pleats, and amount of material needed to cover the windows in the classroom.

SUGGESTED SUBJECT AREA Math and Home Ec.

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Have the students figure out the amount of material needed, pleats and space between pleats, for the windows in your class room.	1. Have a home economist or your Home Ec. teacher come in an talk on draperies. 2. Discuss the enclosed material. 3. Have the class determine where the pleats should be, number of pleats, space between pleats, and amount of material needed to cover the windows in your classroom.	The Know-How and Know Why of Beautiful Windows by L. Restemayers Extension Service, NDSU, Fargo, ND Enclosed Material

SUGGESTED CORRELATION FOR THIS ACTIVITY:

HOW TO FIGURE OUT AMOUNT OF MATERIAL YOU NEED FOR DRAPES TAKING PLEATS INTO CONSIDERATION

The most important thing to remember is to measure for your rods first and mount them before measuring for draperies.

WIDTH - For side draperies, measure the space you want the drapery to cover, and allow twice the width for each panel.

For draw draperies, the fabrics should be 2 - 2½ times the width, of the fixture plus 2½" for each panel for overlap plus 2½" for return on each side. Add 1½ - 2" for hem. Formula = 2-2½ times the width plus 2½" for overlap plus 2½" for return and 1½" - 2" for hem.

LENGTH - Amount needed for one panel is the length from the rod to the sill, apron or floor plus an allowance for bottom hem, leading and shrinkage.

Hem 4 to 6 inches (unlined draperies ; a double hem is more desirable)

Topheading 3½ - 4½ inches

Shrinkage - check label, maximum shrinkage is shown in percentage. 1% allow ½ inch per yard; 2% allow 3/4 inch per yard.

FIGURING PLEAT ALLOWANCE First pleats are most often made in uneven numbers (3, 5, 7, etc.) numbers of pleats depends upon the amount of fullness to be taken up in order to fit rod. Determine the space to be covered in the rod, plus any overlap and the distance around the end. (return) (remember each side of drapery covers half the length of the rod). Subtract this from width of the hemmed drapery piece. This will give you amount of material to be taken up in pleats. Formula = d - (½rL + rr + 0) = Amount to be taken up in pleats

rL- rod length, rr - rod return, 0 - overlap, d- width of hemmed drapery piece

EXAMPLE: ½ rod length - 15", rod return - 3", overlap - 2", width of drapery piece - 45", d -(rL + rr + 0) = Amount; 45" -(15"+ 3" + 2") = amount 45" - 20" = Amount 25" = Amount for pleats. If five pleats are desired, pleats may take 3 1/3" - 5" of fabric, depending on weight of material.

Figuring space between pleats

1. Space between pleats should be slightly narrower, than pleats themselves.

2. The distance from wall to first pleat, plus the overlap; subtract this from the desired total width of the finished drapery.

Formula = fd - (rr + o) = space

fd - finished pleated drapery , rr- rod return , o - overlap

EXAMPLE - Rod return - 3" overlap - 2" finished pleated drapery - 20"

20" - (3" + 2") = space, 20" - 5" = space, 15" = space

Note: the number of spaces is always one less than the number of pleats being used. (Example: 5 pleats - 4 spaces; 10 pleats - 9 spaces, etc.) In this case we have 5 pleats so we will have 4 spaces. So we divide 4 into 15" to get the amount of the space. 3 3/4" between pleats.

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To acquaint students with the use of Mathematics in sports.

SPECIFIC BEHAVIORAL OBJECTIVE: After demonstrating a knowledge of math in relationship to sports, each student will successfully complete 80% of the worksheets.

SUGGESTED SUBJECT AREA Math

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Have students complete worksheet with special emphasis on the use of conversion of units of measure as they are used in everyday life or in sports related recreation or occupations.	1. Introduce the variety of uses of math in sports by using the worksheets provided by Department of Public Instruction. Stress the practicality of many basics in math. 2. Hand out worksheets and have students complete and discuss.	Enclosed material "Math in Sports" - a publication provided by: George Fors, Math Consultant Dept. of Public Instruction State Capitol Bismarck, ND 58501

SUGGESTED CORRELATION FOR THIS ACTIVITY:

TRACK

The track section includes conversion of units of measure, the rate, time, and distance relationship, and averaging.

A possible research exercise to be used while the Olympics are in progress is to have a student (or students) find and report on the Decathlon event, its component events, scoring, and records. The method of scoring could provide a good exercise in averaging. Track buffs in class might suggest a scoring scheme for a high school decathlon event based on state or conference high school records.

1. An outdoor track in the U. S. measures 440 yeards one foot in from the inner circumference.

   440 yd. = _____ ft.
   440 yd. = _____ in.

2. Indoor tracks seldom measure more than 220 yards.

   220 yd. = _____ ft.
   220 yd. = _____ in.

3. In a relay race, four runners run equal distances for a total of one mile.

   1 mile = _____ ft.

   What part of a mile did each runner run? _____
   How many feet did each run? _____
   How many yards did each run? _____

4. Until 1961 nine sprinters shared the world record for the 100 yard dash in 9.3 seconds. How many yards per second did they run? _____

5. Bob Hayes lowered the record to 9.1 seconds in 1963. How many yards per second did he run? _____

6. In a two mile relay race there were four runners. What part of a mile did each run (if each ran an equal distance)? _____
   How many feet did each run? _____
   How many yards did each run? _____

7. An athlete at the Drake Relays threw the discus the following distances. Find the average distance. 165 ft., 172 ft., 191 ft., 167 ft., and 170 ft.
   _____

8. Change the following meter runs to feet.

   100 meters ≈ _____ ft.
   200 meters ≈ _____ ft.
   400 meters ≈ _____ ft.
   800 meters ≈ _____ ft.
   1500 meters ≈ _____ ft.
   5000 meters ≈ _____ ft.
   10000 meters ≈ _____ ft.

Note: 1 meter = approx. 3.2808 ft. 1 meter = approx. 1.0936 yds. ≈ means "approximately equal to"

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To acquaint the student with the use of Mathematics in the developing of the horsepower and displacement of an engine.

SPECIFIC BEHAVIORAL OBJECTIVE: After discussing the relationship of Math to engine displacement and horsepower, each student will gain an understanding of this by successfully completing the worksheet.

SUGGESTED SUBJECT AREA Math

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Have the students discuss cubic inches, engine displacement, and horsepower of an engine in relationship to mathematics. Have them complete the worksheet, putting emphasis on the need for Math in determining horsepower and engine displacement.	1. Discuss the meaning of cubic inches and engine displacement and horsepower of an engine. A. Displacement in a cylinder is the difference between the number of inches of air in the cylinder when the piston is at the bottom of its stroke and the amount of air in the cylinder when the piston reaches the top of its stroke. B. Also meaning of formula for engine displacement. $d = R^2 \times \text{stroke} \times \text{no. of cylinders}$ d- stands for displacement R- radius of the bore R= ½ x bore C. There are two formulas for engine horsepower. First Formula: Brake horsepower is determined by measuring the force exerted on a friction brake.	Automotive Service Volume II by Ray Kuns. Bruce Publishing Co. Modern Applied Mathematics Houghton-Mifflin Company Boston

SUGGESTED CORRELATION FOR THIS ACTIVITY:

Use with unit on formulas

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
90	C. continued $bhp = \frac{RNW}{5252}$ where R = length of arm (from center of drum) N = Engine speed in rpm (revolutions perminute) W = Load on scale in pounds Second formula: SAE (Society of Automotive Engineers) hp. is based on the number of cylinders and their diameters. (bore) $SAE\ hp = \frac{D^2 x\ N}{2.5}$ D = Bore N = Number of cylinders 2. Have the students complete and discuss the worksheet.	

WORKSHEET

1. Find the brake horsepower of a gasoline engine if the arm is 3 ft. long, the load (w) is 300 lbs, and N= 3000 rpm.

2. Find the approximate brake horsepower of a go-car V-8 engine that registers 135 lbs at the end of a prong brake arm 2½ ft. long.

3. Find the cubic inch displacement of a V-8, when the bore is 4.125" and stroke is 3.750".

4. Find the cubic-inch displacement of a 6 cylinder when the bore is 3.400" and stroke is 4.125".

5. Calculate the SAE horsepower for a V-4 power plant engine with a 4¼" bore.

6. Find the SAE horsepower of a 6-cylinder gasoline engine with a bore of 4".

EXAMPLES

Engine Horsepower

1. If the arm (R) is 3 ft. long, the load (w) is 100 lb., and the engine speed (N) is 1000 rpm, find the brake horsepower.

$$bhp = \frac{RNW}{5252}$$

$$= \frac{3 \times 1000 \times 100}{5252}$$

$$= \frac{300{,}000}{5252}$$

$$= 57.12 \text{ brake horsepower}$$

2. Find the displacement of an engine with a 3½" bore, a 3½" stroke, 8 cylinders ($\pi = \frac{22}{7}$)

$$r = \tfrac{1}{2} \times 3\tfrac{1}{2} = \tfrac{1}{2} \times \frac{7}{2} = \frac{7}{4}$$

$$d = \frac{22}{7} \times \left(\frac{7}{4}\right)^2 \times 3\frac{1}{2} \times 8$$

$$= \frac{22}{7} \times \left(\frac{7}{4}\right)^2 \times \frac{7}{2} \times 8$$

$$= \frac{\overset{11}{\cancel{22}}}{\cancel{7}} \times \frac{\overset{1}{\cancel{7}}}{\cancel{4}_{2}} \times \frac{7}{\cancel{4}} \times \frac{7}{\cancel{2}} \times \cancel{8}^{4}$$

$$= \frac{11 \times 7 \times 7}{2}$$

$$= \frac{77 \times 7}{2}$$

$$= \frac{539}{2} = 269.5 \text{ cu. in.}$$

or 270 cu. in.

3. Go-car 6-cylinder has a bore of 3". Find its SAE. Horsepower rating

$$\text{SAE hp} = \frac{0^2 \times N}{2.5}$$

$$= \frac{3^2 \times 6}{2.5}$$

$$= \frac{9 \times 6}{2.5} = \frac{54}{2.5}$$

$$= 21.6$$

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To acquaint the student with the use of Mathematics in Crop plantation.

SPECIFIC BEHAVIORAL OBJECTIVE: After discussing mathematics in agriculture each student will demonstrate a knowledge of Mathematics in relationship to garden planting, by successfully completing the worksheet.

SUGGESTED SUBJECT AREA Math (general)

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Have the students compute the number of seeds needed for a garden, if the rows are 150 ft. long.	1. Introduce by having discussion on the planting in general. (weights, measures, distances, depths, and numbers.) 2. County agricultural agent could be interviewed, or you may have him speak to your class. 3. Have the students compute the number of seeds needed for this garden plan. 4. Discuss why we need this specific number of seeds.	1. Arithmetic in Agriculture Interstate Publishers Danville, Ill. 2. County Agricultural agent

SUGGESTED CORRELATION FOR THIS ACTIVITY:

TABLE VII—REFERENCE TABLE FOR VEGETABLE GROWERS*

Crop	Per 100-ft. Row		Distance Apart in Inches			Depth to Plant in Inches	
	Seed to Plant	No. Plants Thinned or Transplanted	Horse Cultivated Rows	Hand Cultivated Rows	Plants in the Row	Field	Under Glass
Asparagus Plants	.....	50–66	36–48	36–48	18–24	6–9	.....
xBeans, Bush	½ lb.	300–400	30–36	18–24	3–4	1–1½	½
Beans, Bush Lima	½ lb.	150–200	30–36	18–30	6–8	1–2	½
Beans, Pole	½ lb.	35§	36–48	36	36–48	1–2	½
xBeets	1 oz.	300–400	24–36	12–18	3–4	1	½
Broccoli†	1 pkt.	50	36	24–30	24	.....	½
Brussels Sprouts†	1 pkt.	50–66	36	24–30	18–24	.....	½
Cabbage, Early†	1 pkt.	66	24–36	24–30	18	.....	½
Cabbage, Late†	1 pkt.	40–50	36–42	24–30	24–30	.....	½
xCarrots	½ oz.	400–600	24–30	12–18	2–3	½	.....
Cauliflower†	1 pkt.	50–66	36–42	24–30	18–24	.....	½
Celeriac†	1 pkt.	200	30–36	18–24	6	.....	½
Celery†	1 pkt.	150–300	36–48	18–24	6–8	.....	½
Chard, Swiss	½ oz.	150–200	24–36	18–24	6–8	1	.....
Corn, Sweet	½ lb.	33–66§	36–42	24–30	18–36	1–2	.....
Cucumber	½ oz.	20–25§	48–60	36–60	48–72	1–2	½
Eggplant†	1 pkt.	50–66	30–36	24–30	18–24	.....	½
Endive†	1 pkt.	100	24–30	18	8–12	½–1	½
Horseradish Roots	.....	66–100	30–36	24–30	12–18	.....	.....
xKale	½ oz.	50–100	24–30	18–24	12–24	½	.....
xKohlrabi‡	½ oz.	100–200	24–30	18–24	6–12	½	½
Leek	½ oz.	150–300	24–30	12–18	4–6	1	.....
xLettuce, Leaf	½ oz.	150–300	24–30	12–18	4–6	½	½
Lettuce, Head†	1 pkt.	100	24–30	18–24	12	.....	½
Muskmelon	½ oz.	20§	48–60	48–60	60–72	1–2	½
Onion, Seed	½ oz.	400–600	24–30	12–18	2–3	½–1	.....
Onion, Sets	2 qts.	400–600	24–30	12–18	2–3	2–3	.....
Onion, Transplants	½ oz.	400	24–36	12–18	2–3	.....	½
Parsley	½ oz.	200–400	24–30	12–18	3–6	½	½
Parsnips	½ oz.	200–400	30–36	18–24	3–6	½–1	.....
xPeas	1 lb.	400–600	30–36	24	2–3	1–2	.....
Peppers†	1 pkt.	50–66	30–36	18–24	.....	½	½
Potato, Irish	8-10 lbs.	66–100§	30–36	24–26	12–18	4–6	.....
Potato, Sweet (Plants)	.....	65–76§	36–48	36–48	12–18	3–4	.....
Pumpkin	½ oz.	11–14§	96–144	96–144	84–108	1–2	½
xRadish, Summer	½ oz.	600–800	24–36	12–18	1½–2	½–1	.....
Rhubarb Plants	.....	33	36–60	36–60	36–60	2–3	.....
xRutabaga	½ oz.	150–200	30–36	18–24	6–8	½–1	.....
Salsify	½ oz.	200–400	30–36	18–24	2–3	½–1	.....
xSpinach	½ oz.	300–400	30–36	12–18	3–4	1	.....
Spinach, New Zealand	1 oz.	66–100	30–36	30–36	12–18	1	.....
Squash, Summer	½ oz.	25–33§	36–48	36–48	36–48	1–2	½
Squash, Winter	½ oz.	15–20§	84–108	84–108	84	1–2	½
Tomatoes†	1 pkt.	25–35	36–60	36–48	36–48	.....	½
xTurnips	½ oz.	300–400	24–36	18–24	3–4	½–½	.....
Watermelon	½ oz.	11–14§	96–144	96–144	84–108	1–2	½

* This Table is reproduced from Minnesota Bulletin No. 315.
x Crops which may be used in succession planting or which may be used as both spring and fall crops. ‡ Early crop often transplanted. Late crop sown in the field.
† Transplanted in this region. § Grown in hills. Pkt.—Packet.

NUMBER OF ROWS	CROP
1	Radishes
2	Carrots
2	Late peas
1	Cauliflower
1	Cucumbers
2	Early potatoes

NUMBER OF ROWS	CROP
1	Lettuce
2	Parsnips
2	Early peas
2	Cabbage
1	Egg Plant and Peppers - ½ inch

NUMBER OF ROWS	CROP
3	Onion
3	Beets
3	Beans
2	Tomatoes
3	Muskmelon
3	Sweet Corn

ANSWERS

Radishes - 1 1/8 oz.

Carrots - 1 ½ oz.

Late Peas - 3 lbs.

Cauliflower - 2 pkt.

Cucumber - 3/8 oz.

Potatoes - 30 lbs.

Lettuce- 3/8 oz

Parsnips - 1 ½ oz.

Early peas - 3 lbs.

Cabbage - 3 pkt.

Egg Plant - 1 pkt.

Peppers - 1 pkt

Onions - 2¼ oz

Beets - 4½ oz.

Beans - 2¼ oz

Tomatoes - 3 pkt.

Muskmelon - 3/8 oz.

Sweet Corn - 1 1/8 lbs.

CAREER DEVELOPMENT ACTIVITIES

1

BROAD OBJECTIVE: To acquaint the student with the use of mathematics in Agriculture.

SPECIFIC BEHAVIORAL OBJECTIVE: Each student will observe the need for Math in agriculture by writing out a budget for a ranch.

SUGGESTED SUBJECT AREA Math

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Have the students set up a feed budget for a ranch estimating your needs for the coming year and show how you will meet them.	1. Discuss 1. Amount of feed per animal 2. Different types of feed, different amounts. 3. Amount of gain per animal 4. Cost of feed 5. Needs of animals 6. Does overhead exceed selling price Have the students set up a feed budget and discuss how they will meet it.	Arithmetic in Agriculture Interstate Publishers Danville, Ill. Agriculture Extension Division Minnesota Extension Division

SUGGESTED CORRELATION FOR THIS ACTIVITY:

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SAMPLE BUDGET

A famer has 10 cows averaging 400 pounds of butterfat, 6 horses and 8 brood sows. How much hay and gain will he need for a period of 6 months.

For 10 cows:

10 x 3 = 30 tons hay, or, silage
10 x 2 ='20 tons and 10 x 3 = 30 tons silage
10 x 2,400 lbs = 24,000 lbs, grain

For 6 horses:

6 x 2 = 12 tons hay. Assume 1/3 bushels oats per head daily

6 x 1/3 x 180 (days) = 360 bushels oats needed

For 8 brood sows:

8 x 4 x 6(months) = 192 bushels corn needed

Adding he will need:

42 tons of hay without silage or 32 tons with silage
360 bushels of oats
192 bushels of corn
2,400 pounds of grain

Period covered from.....to.....

	No. Head	Clover or Alfalfa Hay, Tons	Other Hay, Tons	Silage, Tons	Fodder, Tons	Corn, Lbs.	Barley, Lbs.	Oats, Lbs.	Lbs.	Lbs.	Total Grain, Lbs.
Cows											
Bull											
Yearlings, Dry 2-Year-Olds											
Calves											
Horses											
Sheep											
Colts											
Chickens											
Brood Sows											
Spring Pigs											
Fall Pigs											
Total required											
Total in tons and bushels											
Total available											
Above requirements											
Below requirements											
Deficits to be made up as follows:											

98

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To introduce students to the type of work done by a bookkeeper, or payroll clerk.

SPECIFIC BEHAVIORAL OBJECTIVE: To be able, when given a gross monthly income, to determine the social security and the Federal Income Tax withholdings and the net monthly income. Also, to be able to prepare a payroll check. (Math Objective: Finding a percent of a number.)

SUGGESTED SUBJECT AREA Mathematics

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
A. Using present social security regulations, determine the social security withholding on various monthly salaries. B. Determine the net income when given the gross income and the tables giving the social security and federal income tax withholdings. C. Prepare a payroll check.	Briefly explain "gross" and "net" income and the relevance of social security and Federal Income Tax withholdings to these terms. Have the students fill out the worksheet of sample problems. Have the students prepare a payroll check using the prepared form.	Current Employer's Tax Guide (Circular E), Publication 15 Internal Revenue Service, Department of the Treasury

SUGGESTED CORRELATION FOR THIS ACTIVITY:

A. FINDING SOCIAL SECURITY WITHHOLDING

Sample Problem

Gross Monthly Salary $450

$450 × .052 = $23.40

Social Security withholding (5.2% of monthly salary, maximum $405.60)

Additional Problems

Gross Monthly Salary	Social Security Withholding
1. $290	$15.08
2. $425	$22.10
3. $736.75	$38.31

B. FINDING NET INCOME ("Take-Home Pay")

Sample Problem

Gross Monthly Salary		$325.00
Social Security withholding	$16.90	
Federal Income Tax withholding (assume married, paid monthly 2 exemptions)	22.00	
Total withholding		38.90
Net Monthly Salary		$286.10

Additional Problems

Gross Monthly Salary	Net Monthly Salary (Same Assumptions as in sample prob.
1. $340	297.72
2. $476	405.85
3. $832.25	687.57

C. PREPARING A PAYROLL CHECK

A sample filled out check and blank check are provided. The teacher can provide a gross monthly income for the students to use in filling out the blank check.

A. FINDING SOCIAL SECURITY WITHHOLDING

Sample Problem

Gross Monthly Salary $450

$$\begin{array}{r} \times .052 \\ \hline 900 \\ 2250 \\ \hline \$23.40 \end{array}$$

Social Security withholding (5.2% of monthly salary, maximum $405.60)

Additional Problems

Gross Monthly Salary	Social Security Withholding
1. $290	
2. $425	
3. $736.75	

B. FINDING NET INCOME ("Take-Home Pay")

Sample Problem

Gross Monthly Salary		$325.00
Social Security withholding	$16.90	
Federal Income Tax withholding (assume married, paid monthly 2 exemptions)	22.00	
Total withholding		38.90
Net Monthly Salary		$286.10

Additional Problems

Gross Monthly Salary	Net Monthly Salary (Same Assumptions as in sample prob.
1. $340	
2. $476	
3. $832.25	

C. PREPARING A PAYROLL CHECK

A sample filled out check and blank check are provided. The teacher can provide a gross monthly income for the students to use in filling out the blank check.

EMPLOYEE'S STATEMENT OF EARNINGS AND DEDUCTIONS - DETACH AND RETAIN

ABC KIDDIE SHOP

PERIOD ENDING 9-31 19 72

NAME MIKE BROWN

160 REGULAR HOURS @	$1.80	288.00
OVERTIME HOURS @		
TOTAL EARNINGS		288.00
SOCIAL SECURITY TAX	14.98	
WITHHOLDING U.S. INCOME TAX	17.00	
TOTAL DEDUCTIONS		31.98
NET PAY		256.02

642

9-31 19 72 77-33/913

PAY TO THE ORDER OF MIKE BROWN $256.02

TWO HUNDRED FIFTY-SIX & 02/100 DOLLARS

THE DAKOTA NATIONAL BANK OF BISMARCK-NORTH DAKOTA

Jake Smith
(NAME OF CHECK PREPARER)

⑆0913⑈0033⑆

102

EMPLOYEE'S STATEMENT OF EARNINGS AND DEDUCTIONS - DETACH AND RETAIN

KIRKWOOD PLAZA

PERIOD ENDING 19

NAME

REGULAR HOURS @		
OVERTIME HOURS @		
TOTAL EARNINGS		
SOCIAL SECURITY TAX		
WITHHOLDING U.S. INCOME TAX		
TOTAL DEDUCTIONS		
NET PAY		

101

19 77-33/913

PAY TO THE ORDER OF $

DOLLARS

THE DAKOTA NATIONAL BANK OF BISMARCK-NORTH DAKOTA

⑆0913⑈0033⑆

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To introduce students to basic procedure of electronic data processing in common life experience.

SPECIFIC BEHAVIORAL OBJECTIVE: Each student will give three ways in which data processing is applied to everyday life.

SUGGESTED SUBJECT AREA Mathematics

SUGGESTED GRADE LEVEL Jr. Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
A. Examination of: 1. student requests 2. course masters 3. class lists 4. student schedules B. Detailed explanation of various codings on 1-4 of "A" above.	Distribute sample copies of student schedules to encourage discussion and questioning. If possible, actual computer schedules of students who are involved should be compared with each other. Have students bring in specific data processing jobs from their parents experience with computers. Individuals or small groups could catagorize into various job types. (e.g., some use punched cards, magnetic discs, some use perforated tapes.)	1. Student requests 2. Course masters 3. Class lists 4. Student schedule Resource person acquainted with data processing, especially a person familiar with student scheduling. Film strips and cassette from Eye Gate. "Vocational Opportunities in Data Processing"

SUGGESTED CORRELATION FOR THIS ACTIVITY:

CAREER [illegible]

BROAD OBJECTIVE: To acquaint the students with the world-of-work in action by field trips, specifically in the electronic data processing area.

SPECIFIC BEHAVIORAL OBJECTIVE: Each student will give at least three reasons that would indicate why data processing would be a good occupation for an individual interested in Math.

SUGGESTED SUBJECT AREA: Math

SUGGESTED GRADE LEVEL: [illegible]

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Field trip	1. Send students in small groups during hours convenient to them (not necessarily school time) to study computers in action. 2. During class discussion following trip, have students discuss what was observed about: a. Working conditions b. Environment c. Attitudes and conduct of working personnel d. How mathematics is used.	Nearest computer center available.

SUGGESTED CORRELATION FOR THIS ACTIVITY:

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To acquaint the student with the various occupations that require algebra.

SPECIFIC BEHAVIORAL OBJECTIVE: Each student will demonstrate an understanding of the necessity of algebra for various occupations by successfully completing 80% of the evaluation questions.

SUGGESTED SUBJECT AREA Algebra

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Oral Report Panel Discussion	1. Each student will give a short report on the need for algebra for a certain job. 2. Have each student pick a job that he or she is interested in from attached sheet. 3. Each student will then research his job area looking for these points: a. amount of school needed for their particular job. b. why they need algebra for this particular field. c. give an example of how they would use algebra for this job. d. have the students write one test question for their field. 4. Each student will then give a short report on their job. 5. For an evaluation compile all of the students test questions into a quiz to be given at end of this activity.	"School Subjects and Jobs" by John Brochard, SRA Guidance Series

SUGGESTED CORRELATION FOR THIS ACTIVITY:

CONTINUATION ACTIVITY SHEET

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
	Second Technique: Panel Discussion Divide the class into five groups. Each group will pick four or five jobs that they are interested in from attached sheet. Each group will then research the areas chosen as a cooperative effort, looking for the same information as asked for in Technique #1.	

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CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To acquaint the students with the type of work done by an employee of the Social Security Administration.

SPECIFIC BEHAVIORAL OBJECTIVE: To be able to determine average yearly income for retirement purposes. (Math objective; to be able to follow directions and find an average.)

SUGGESTED SUBJECT AREA Mathematics

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
When given the necessary information, to determine average yearly income covered by social security.	Many times people are interested in knowing what their social security retirement benefits will be, but they have no idea of how to figure them out. This activity and the one that follows it will give students experience in determining retirement income. It might be well for the teacher to briefly explain the social security program. As of 1971, the employee contributed 5.2 of his salary up to $7,800. Thus, his maximum contribution would be $405.60 (.052 x $7800). The employer would have to match this by depositing an equal amount in the employee's social security account. The first step in determining what the employee's retirement income would be is to calculate his average yearly income.	"Social Security Benefits" Mathematics for Daily Living by Manny Lewis McCormick, Mathews, Publishers The following are publications of the Social Security Administration of the U. S. Dept. of Health, Education and Welfare. "Your Social Security" Publication No. (SSA) 72-10035 "If You Become Disabled" Publ. No (SSA) 72-10029 "Social Security Benefits - How You Earn Them" Publication No. (SS1-47) 426-959 "You Can Work and Still Get Social Security Benefits" Publication No. (SS1-92) 397-326

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SUGGESTED CORRELATION FOR THIS ACTIVITY:

AVERAGE YEARLY EARNINGS

1. Count the number of years to be used in figuring your average earnings as follows:

   a. If you were born after 1929, start with the year you reached 27.
   b. Count your starting year and each year up until (but not including) the year you reached 65, if you are a man and 62, if you are a woman

2. List the amount you earned covered by social security for all years beginning with 1951. Do not count more than $3,600 for each year 1951 through 1954; $4,200 for each year 1955 through 1958; $4,800 for each year 1959 through 1965; $6,600 for 1966 and 1967; $7,800 for 1968 through 1971, and $9,000 for 1972 and after

3. Cross off the years of lowest earnings until the number remaining is the same as your number of years in step 1.

4. Add up your earnings for the years left on your list and divide by the number of years you used. The result is your average yearly earnings covered by social security and used to determine your retirement benefits.

SAMPLE PROBLEM

John was born in 1935. His earnings for the years to be included were:

1951 - 0
1952 - 0
1953 - 0
1954 - 400
1955 - 600
1956 - 600
1957 - 2000
1958 - 4000
1959 - 4200
1960 - 4500
1961 - 4800
62 - 5300
63 - 5800
64 - 6200
65 - 6600
66 - 7000
67 - 7500
68 - 8000
69 - 8500
1970 - 8700
71 - 8900
72 - 9100
all years after 1972 were
in excess of $9000

What would be John's average yearly income covered by social security?

SOLUTION: John became 27 years old in 1962. From there, it will be 38 years until he becomes 65. Cross off the years of lowest earnings until you have 38 years left. This would leave earnings for 1962 through 1999. Remember the limitation: a maximum of $4800 for 1959 through 1965, $6,600 for 1966 and 1967, etc.

Years	Earnings
1962-65	$19,200 (4 x 4800)
1966-67	13,200 (2 x 6600)
1968-71	31,200 (4 x 7800)
1972-1999	252,000 (28 x 9000)
38 total years	$315,600 total earnings

Average yearly earnings (nearest dollar) 315,600 ÷ 38 = $8,305

This average yearly earnings would then be compared with a table such as is shown in the following activity to determine retirement income.

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To familiarize the students with the type of work done by an employee of the social security administration.

SPECIFIC BEHAVIORAL OBJECTIVE: After completion of this activity, each student will be able to list 4 responsibilities of a social security worker.

SUGGESTED SUBJECT AREA Mathematics

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
To complete a worksheet on which social security retirement benefits for different families have to be determined.	If you used the preceding activity, which explains how to calculate average yearly income, you probably explained the operation of our social security system. If the students have not been briefed on how social security works, they should be before they proceed with the problems. The current (1971) Social Security regulations concerning benefits are presented on the worksheets. The teacher should first work a sample problem utilizing the given information, and then have the students tackle the worksheet. All the problems will be based on the assumption that the husband was covered by Social Security and not the wife. It probably should be pointed out that a worker can also receive disability payments, the amount for the worker being generally the same as his retirement benefit at age 65. His wife and children, if the children are under 18, would also receive disability benefits.	"Social Security Benefits" Mathematics For Daily Living by Manny Lewis: McCormick-Mathers, Publisher The following are publications of the Social Security Administration of the U. S. Dept. of Health, Education and Welfare: "Your Social Security," Publication No. (SSA) 72-10035. "If You Become Disabled," Publication No. (SSA) 72-10029 "Social Security Benefits - How You Earn Them" Publication No (SS1-47) 426-959 "You can Work and Still Get Social Security Benefits" Publication No. (SS1-92) 397-326 "Disabled?" Publication No. (SS1-69) 388-954

Social Security
Retirement Benefits

The amount of monthly retirement income the husband receives at age 65 is called the primary benefit. This primary benefit is based on the husband's average yearly earnings from which social security deductions were taken during his working years.

Both the wife and each child under the age of 18 receive 50% of the primary benefit. If the child is going to school, his benefits continue until he is 22. If there is no child under 18 in the family, the wife receives no benefits until she, herself, reaches retirement age.

A husband retiring at 62 receives 80% of the primary benefit he would receive upon retiring at 65. If the husband is retired, the wife's retirement age can be as early as 62. If she begins taking her benefits at that time, however, the amount would be only 37½% of the primary benefit. If she waits until she is 65, she will receive 50% of the primary benefit. The maximum family benefit is $482.70.

Retirement Benefits

Person	Percent of Primary Benefit
Husband 68 or older	100%
Wife 65 or older	50%
Wife with child under 18	50%
Child under 18	50%
Child under 22 attending school	50%
Husband at 62	80%
Wife at 62	37½%

EXAMPLES OF HUSBAND'S BENEFITS
(upon retirement at age 65)

Average Yearly Earnings	Monthly Benefits
$923 or less	$ 70.40
$1,800	$111.90
$3,000	$145.60
$4,200	$177.70
$5,400	$208.80
$6,600	$240.30
$7,800	$275.80

Sample Problems

1. Husband, 65, retires with an average yearly income of $4,200. Wife is 67. What is their retirement income?

   Husband = $177.70
   Wife = .50 x 177.70 = 88.90*
   Total Benefit = $266.60

   All amounts should be rounded off correct to the nearest $.10.

   Remember, the wife, even if she's 65 cannot receive retirement benefits unless her husband has retired.

2. Husband, age 62, retires with an average yearly income of $7800. Wife is 52, and son is 17. What is their retirement income?

   Husband = .80 x 275.80 = $220.60
   Wife = .50 x 275.80 = 137.90*
   Son = .50 x 275.80 = 137.90
   $496.40
   Total monthly benefit = $482.70±

   * Wife with child under 18 receives 50% of primary benefit.
   ± The maximum family benefit is $482.70.

3. Husband, age 65, retires with an average yearly income of $5,400. Wife is also 65. What is their retirement income?

4. Same as #3, except husband is 64 and wife is 63.

5. Husband, age 67, retires with an average income of $7,800. Wife is 63, and son is 21 and attending college.

ADDITIONAL PROBLEMS

1. Husband, age 65, retires with an average yearly income of $5,400. Wife is also 65. What is their retirement income?

Husband	=	$208.80
Wife	= .50 x $208.80 =	$104.40
Total Monthly Benefit	=	$313.20

2. Same as #1, except husband is 64 and wife is 63.

Husband	= .80 x $208.80 =	$167.00
Wife	=.375 x $208.80 =	$ 78.30
Total Monthly Benefit	=	$245.30

3. Husband, age 67, retires with an average income of $7800. Wife is 63, and son is 21 and attending college.

Husband	=	$240.30
Wife	= .375 x 240.30 =	90.10*
Son	= .50 x 240.30 =	120.20
Total Monthly Benefit	=	$450.60

* Wife does not receive 50% of primary benefit for son because he is not under 18. Son receives benefit because he is in school and under 22.

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To show correlation between promptness, attendance and work at school with world of work.

SPECIFIC BEHAVIORAL OBJECTIVE: Each student will record and compute his weekly time sheet, figuring hours in classroom and weekly pay.

SUGGESTED SUBJECT AREA Math

SUGGESTED GRADE LEVEL Jr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Each student will have a time sheet and record his time in and time out each day. He will then compute his earnings each week.	1. Make up and duplicate a time sheet. 2. Have students record time in and time out of classroom each day. 3. Each student could be assigned a dollar value per hour. This could be correlated to the grade he received last recording period. A = $4.00 per hour, B = $3.00, C = $2.00, D = $1.00 4. Raises could be given the next reporting period according to change in grades. 5. Emphasis should be given to the promptness, attendance, and quality of work comparison.	Time sheet.

SUGGESTED CORRELATION FOR THIS ACTIVITY: Multiplication or decimal units.

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To help students understand Federal Income Taxes

SPECIFIC BEHAVIORAL OBJECTIVE: Following the discussion of Federal income taxes, each student will complete a Federal income tax return.

SUGGESTED SUBJECT AREA Mathematics

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
This particular activity is intended to be used as a separate unit in mathematics. The aim is to use practical problems which are examples of a student working.	1. Discuss: A. Why we have taxes? B. History of taxes. C. Sources of tax monies. D. Government expenditures. 2. Go through the income tax forms with students, filling out the areas necessary for each person's individual income (projected).	"Teaching Taxes Program" Publication 21 Internal Revenue Service Also Available: "Careers in Taxation" Publication 491 Internal Revenue Service Forms: Employee's Witholding Exemption Certificate Witholding Statement (W-2 Form) Form 1040 Standard deduction Itemized deductions

SUGGESTED CORRELATION FOR THIS ACTIVITY:

SAMPLE W-4 FORM

FORM W-4 (Rev. July 1970)
Department of the Treasury
Internal Revenue Service

Employee's Withholding Exemption Certificate

Type or print full name ..... Social Security Number .....

Home address ..... City ..... State ..... ZIP code .....

EMPLOYEE:

File this form with your employer. Otherwise, he must withhold U.S. income tax from your wages without exemption.

EMPLOYER:

Keep this certificate with your records. If you believe the employee claimed too many exemptions advise your District Director.

HOW TO CLAIM YOUR WITHHOLDING EXEMPTIONS

1. If SINGLE (or if married and wish withholding as single person), write "1." If you claim no exemptions, write "0" . . . .
2. If MARRIED, one exemption each is allowable for husband and wife if not claimed on another certificate.
   (a) If you claim both of these exemptions, write "2"; (b) If you claim one of these exemptions, write "1"; (c) If you claim neither of these exemptions, write "0" . . . . . .
3. Exemptions for age and blindness (applicable only to you and your wife but not to dependents):
   (a) If you or your wife will be 65 years of age or older at the end of the year, and you claim this exemption, write "1"; If both will be 65 or older, and you claim both of these exemptions, write "2" . . . . . .
   (b) If you or your wife are blind, and you claim this exemption, write "1"; If both are blind, and you claim both of these exemptions, write "2" . . . . . .
4. If you claim exemptions for one or more dependents, write the number of such exemptions. (Do not claim exemption for a dependent unless you are qualified under Instruction 4 on other side.). . . . . .
5. If you claim additional withholding allowances for itemized deductions attach Schedule A (Form W-4) and enter the number of allowances claimed (if claimed you must file a *new* Form W-4 each year) . . . . . .
6. Add the exemptions and allowances (if any) which you have claimed above and enter total . . . . . ☐
7. Additional withholding per pay period under agreement with employer. (See Instruction 1.) . . . . . $

Under the penalties of perjury, I certify that the number of withholding exemptions and allowances claimed on this certificate does not exceed the number to which I am entitled.

(Date) ....., 19 (Signed) .....

SAMPLE W-2 FORM

1

WAGE AND TAX STATEMENT—1970

(For use in State or City authorizing combined form)

Employer's State Identification Number

Copy A—
For Internal Revenue Service

Type or print EMPLOYER'S Federal identification number, name, and address above.

FEDERAL INCOME TAX INFORMATION			SOCIAL SECURITY INFORMATION		STATUS	
Federal income tax withheld	Wages paid subject to withholding in 1970 [1]	Other compensation paid in 1970 [2]	F.I.C.A. employee tax withheld [3]	Total F.I.C.A. wages paid in 1970 [4]	1. Single 2. Married	*
						**

EMPLOYEE'S social security number ▶

Name of State	State Form No.	State income tax withheld
Name of City	**City Form No.**	**City income tax withheld**

*See Circ. E for sick pay reporting. **Gross wages for State if different from Federal.
[1] Includes tips reported by employee. Amount is before payroll deductions or sick pay exclusion.
[2] Report salary or other employee compensation which was not subject to withholding. See Circular E.
[3] One-eighth of this amount was withheld to finance the cost of Hospital Insurance Benefits. The remainder is for old-age, survivors, and disability insurance.
[4] Includes tips reported by employee.

Type or print EMPLOYEE'S name and address (including ZIP code) above.

Uncollected Employee Tax on Tips . . . $

FORM W-2 Department of the Treasury, Internal Revenue Service 16-60871-1 EMPLOYER: See instructions on back of copy D.

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To acquaint the students with the metric system.

SPECIFIC BEHAVIORAL OBJECTIVE: Each student will gain a knowledge of the metric system in relationship to the U. S. system, by successfully completing 80% of the worksheet.

SUGGESTED SUBJECT AREA Math

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
The students will convert metric units to U. S. units and vice versa.	1. Discuss the relationship of the metric unit to the U. S. unit - pro and con. 2. Have the students read and complete the worksheet on converting metric units to U. S. units and vice versa. 3. Have the students discuss the different types of jobs that use the metric system.	1. Modern Applied Mathematics Gold. Carlberg Houghton Mifflin Company, Boston

SUGGESTED CORRELATION FOR THIS ACTIVITY: Use with unit on metric system.

The Trip

Bob and his wife went on a trip to Mexico. The total distance, round trip was 5,219 miles. They averaged 18.3 miles per gallon. Also their car used 5 1/3 quarts of oil. On the way they accumulated 131½ lbs of souvenirs that they brought back.

When they got back, they found out that a tornado had gone through their neighborhood. A 35 meter by 14 meter section of their lawn was damaged. The water level of their swimming pool, which is 20.5 meters by 11.6 meters by 4 meters, was 2.5 meters below normal. Their house was undamaged, except for the west side, which is 6.06 meters long and 3.9 meters wide, was damaged by hail.

From the preceding information compute the following questions.

1. Change the total miles of the trip to kilometers. (Ans. 8,402.59 kilometers)

2. Find the total amount of liters of gas they used. (Ans. 1,067.79 liters)

3. Find the number of kilometers they averaged per liter. (Ans. 7.869, 7.87, 7.85 kilometers per liter - answer will vary with different methods used)

4. Change the number of quarts used to milliliters. (Ans. 5.047 or 5.05 liters)

5. Change the number of pounds of souvenirs they brought back to kilograms. (Ans. 51.48 or 51.5 kolograms)

6. Find the total amount of sod needed, in feet, to replace the section of lawn damaged. (Ans. 5,443.356 or 5,443.36 sp. ft.)

7. Find the volume of water, in cubic yards, they need to fill the pool up to the right level. (Ans. 776.62 or 776.6 cubic yds.)

8. Find the area of the damaged siding in square feet. (Ans. 254.302 or 254.3 sq. ft.)

BROAD OBJECTIVE: To acquaint students with the payroll check and deductions.

SPECIFIC BEHAVIORAL OBJECTIVE: After studying the payroll check and reading "Your Payroll Check", each student will demonstrate a knowledge of the two by answering the questions on "The Payroll Check" worksheet.

SUGGESTED SUBJECT AREA Mathematics

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
By analyzing a sample payroll check* students will become aware of the various deductions and the meaning of "take home pay" to the employee. * Can be integrated with the budgeting section in the mathematics activity section.	1. Distribute information sheet on "The Payroll Check" and have student read it carefully. 2. Discuss the meaning of deductions and how they will affect the "take home" pay of an individual. 3. Emphasize the deductions that are automatically taken out and those that are optional. 4. Hand out "How Well Did You Read?" worksheet, have students complete and discuss.	"The Payroll Check" (attached) Questions - "How Well Did You Read?" Worksheet (attached) "Employer's Tax Guide" Circular E Publication #15 Department of Treasury Internal Revenue Service Filmstrips: ABC'S of Getting and Keeping a Job #7-5-A Budgeting Your Money #7-5-E Eye Gate

SUGGESTED CORRELATION FOR THIS ACTIVITY:

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Payroll Check

XXXX MANUFACTURING

No. 4513

May 31, 1971

2907 16 Street
Bismarck, North Dakota

AMOUNT OF CHECK
------- $437.80 ---------

PAY TO: JOHN P. LEWIS

----------four-hundred and thirty-seven and 80/100---------

XXXX MANUFACTURING COMPANY

TO MANUFACTURER'S BANK
47-182 Bismarck, North Dakota

Non-Negotiable

TREASURER

Date Ending	Record of Payments to	Hours Worked	Regular Earnings	Other Compensation	State Disab.	Fed. O.A.	Withhold. Tax.	Other Deduc.	Amount of Check
5/31/71	John P. Lewis	160	$550.00	------	$5.50	$24.20	$82.50	-----	$437.80

Employee's Stub

WORKSHEET

QUESTIONS - "HOW WELL DID YOU READ?"

1. How much does John earn per month?

2. How many hours did John work?

3. If John is paid at the end of the month, what month does this check cover?

4. Name the bank that this check is drawn upon.

5. Who signed the check? Why?

6. What per cent of his salary did John have to pay to State Disability?

7. What does "Fed.O.A." stand for on the check?

8. For whom does John Work?

9. How much income tax was withheld from John's salary?

10. What types of deductions might come under "other deductions"?

11. What might come under "other compensation"?

12. Describe breifly the various things John would have to do in order to cash his check.

"YOUR PAYROLL CHECK"

Many a person has been unpleasantly surprised when he received his first payroll check. He quickly learns that there is a difference between the amount he earns and the amount he takes home. There are numerous deductions. Some of these may be required by law. Examples of these are:

1. Federal Old Age Insurance (Social Security)
2. Withholding Tax
3. State Disability Insurance
4. City Wage Tax

These taxes account for more than 20 percent of the check. In addition to required deductions, there are voluntary deductions such as group life insurance, charity donations, union and/or professional dues, savings bonds, and others.

These deductions required by law are important. The Social Security deduction applies to your retirement, and the State Disability Insurance provides funds for you when you are unable to work because of illness or disability related to your job. Withholding tax is a means of collecting federal income tax. In addition, some cities tax income.

Deductions that are voluntary depend upon the company and employee. Some unions collect dues through a payroll deduction.

When you hold your first job, you should be prepared to realize that some of your paycheck will have been spent before you even see it.

Taken From:
Choice or Chance: Career Planning and Development
Oakland Unified School District
Alameda County Schools
Haywood, California 94544

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To acquaint students with various aspects of balancing a family budget.

SPECIFIC BEHAVIORAL OBJECTIVE: After completion of this activity, the student will be able to balance the budget presented with this activity and to complete the circle graph enclosed.

SUGGESTED SUBJECT AREA Mathematics

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Given a set amount of money and list of necessary expenditures, students will be given the opportunity to balance a budget. This will give them an indication of where their money goes. Given the various items of the family budget, a circle graph will be developed.	1. Show filmstrip "Budgeting Your Money" 2. Distribute the "Family Budget" worksheet to each student. 3. Briefly discuss the deductions pointing out the difference between "gross" pay and "net" pay. 4. Tell students to divide the money they have into the various categories as they would do it. 5. Discuss the results by listing the high and low estimates in each category. 6. The differences should point out the wide variety of individual preferences as to where money is spent.	Filmstrip: "Budgeting Your Money" Eye Gate 75E Family Budget (attached sheet) Circle Graph (attached sheet)

SUGGESTED CORRELATION FOR THIS ACTIVITY:

"FAMILY BUDGET"

Family of Four (Wife, Husband, Two Children)

GROSS MONTHLY SALARY $700.00

Social Security	$34.75
Federal Income Tax	77.39
State Income Tax	6.15
Hospital Insurance	44.65
Retirement	21.75
	$184.69

NET TAKE HOME PAY: $515.31

HOW MUCH WOULD YOU ALLOW FOR EACH ITEM IN THE FAMILY BUDGET? ($515.31)

SHELTER: _____ House payment, water bill, heat and lights, telephone, house tax, fire insurance.

FOOD: _____ Groceries (keep in mind family of four).

AUTOMOBILE: _____ Gasoline, tires, repair, insurance, money needed to buy new car, and periodic service for car.

RECREATION: _____ Movies, athletic events, vacation for summer months, boats, campers, boat motors, and repair of all these items.

CLOTHING: _____ Four members in family.

CONTRIBUTIONS: _____ Community fund, church contributions, etc.

SAVINGS: _____ For the rainy day.

REPAIR & IMPROVEMENT: _____ Paint house, purchase new lawn mower, fix windows, buy garden equipment, buying new furniture for the house.

INSURANCE: _____ Life (husband, wife), income protection.

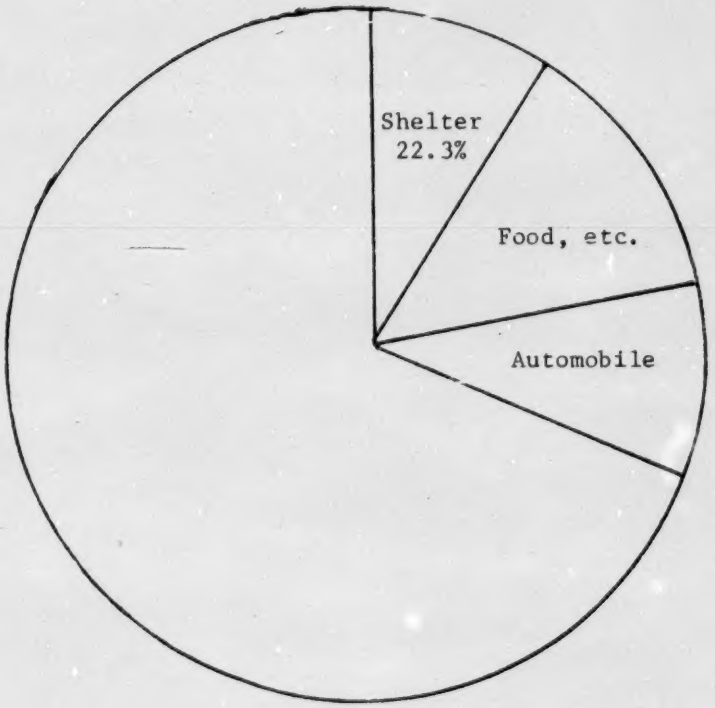
MISCELLANEOUS: _____ Dental and eye care, (special events like taking family for Sunday dinner)

TOTAL: $515.31

HAVE STUDENTS TAKE EACH ITEM OF THE FAMILY BUDGET AND DIVIDE BY THE NET TAKE HOME PAY TO GET THE PER CENT FOR EACH ITEM.

EXAMPLE:

SHELTER $\frac{\$115}{}$ $\qquad \frac{\$115}{\$515.31} = .223 = 22.3\%$



CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To help students understand the various costs of owning a car.

SPECIFIC BEHAVIORAL OBJECTIVE: After each exposure to monthly payment tables, each student will demonstrate a knolwedge of the relationship of to cost in respect to initial cost by filling out the forms for purchasing and financing a car.

SUGGESTED SUBJECT AREA General Math

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Have students use table on monthly payments. 1. New car 2. Used car Have students determine the cost and finance charge of their parents car.	1. Introduce by discussing how Math is needed in this area. 2. Instruct student to interview a person in the insurance field using attached form as a guideline. 3. Have students go through steps of purchasing and financing a car. 4. Following the interview discuss: A. The use of Math B Education and training. C What did you learn, from this interview?	Mathematics for Daily Living McCormick - Mathers Co. Cincinnati Enclosed tables

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SUGGESTED CORRELATION FOR THIS ACTIVITY:

GUIDELINE

1. Name of person interviewed

2. Name of Occupation

3. Education and/or training

4. Discuss the use of Math in his job

Example:

Mr. Brown purchased a new car. He had to borrow $2,100 to do this. He agreed to pay this debt back monthly over a 2-year period.

99.82	per month	19.88 total life insurance
x 24	number of months	
$2,395.68	total amount including life insurance	
-19.88	life insurance	
$2,375.80	amount actually paid on loan	
2,100.00		
275.00	The cost of the loan.	

USED-CAR MONTHLY PAYMENT TABLE

Unpaid Balance	12 MONTHS Amount Per Month	12 MONTHS Total Life-Insurance Premium	18 MONTHS Amount Per Month	18 MONTHS Total Life-Insurance Premium	24 MONTHS Amount Per Month	24 MONTHS Total Life-Insurance Premium	30 MONTHS Amount Per Month	30 MONTHS Total Life-Insurance Premium
$ 20	$ 1.89	$ .10	$ 1.33	$ .15	$ 1.06	$ .21	$ .89	$ .27
40	3.78	.20	2.66	.30	2.12	.42	1.78	.54
60	5.67	.30	3.98	.45	3.18	.63	2.67	.81
80	7.56	.40	5.30	.61	4.24	.84	3.57	1.09
500	47.30	2.50	33.43	3.85	26.50	5.28	22.35	6.84
600	56.76	3.00	40.11	4.62	31.80	6.33	26.82	8.21
700	66.22	3.50	46.80	5.39	37.10	7.39	31.29	9.57
800	75.69	4.00	53.48	6.16	42.40	8.45	35.76	10.94
900	85.15	4.50	60.17	6.93	47.70	9.50	40.23	12.31
1,000	94.61	5.00	66.86	7.70	53.00	10.56	44.70	13.68
1,100	104.07	5.49	73.54	8.47	58.30	11.61	49.17	15.05
1,200	113.53	5.99	80.23	9.24	63.60	12.67	53.64	16.41
1,300	122.99	6.49	86.92	10.01	68.90	13.72	58.11	17.78
1,400	132.45	6.99	93.60	10.78	74.20	14.78	62.58	19.15
1,500	141.91	7.49	100.29	11.55	79.50	15.84	67.05	20.52

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*SOLUTION:

Since a used car is involved, you must use the Used-Car Monthly Payment Table on this page.

(a) Amount of loan = $1,200 - $460 = $740

Amount per month on $700 = $31.29
+ Amount per month on $ 40 = 1.78
Amount per month on $740 = $33.07

(b) Total paid over 30-month period = 30 x $33.07 = $992.10

Total life-insurance premium for $700 = $ 9.57
+ Total life-insurance premium for $ 40 = .54
Total life-insurance premium for $740 = $10.11

EXPLANATION: After making the down payment of $460, Eric still had $740 to repay. The numeral 740 does not appear in the Unpaid-Balance column. Hence, to determine the monthly payment on $740, you have to add the payment on $700 to the payment on $40. The first payment is $31.29, while the second is $1.78, making a total payment of $33.07. Similarly, in answer to Part (b), it is necessary to add the total life-insurance premium on $700 to that of the premium on $40. The total of these ($9.57 and $.54) is $10.11. Why was the Used-Car Monthly Payment Table used? How much would the monthly payment have been if the debt had been paid off over a 12-month period?

NEW-CAR MONTHLY PAYMENT TABLE

Unpaid Balance	18 MONTHS Amount Per Month	18 MONTHS Total Life-Insurance Premium	24 MONTHS Amount Per Month	24 MONTHS Total Life-Insurance Premium	30 MONTHS Amount Per Month	30 MONTHS Total Life-Insurance Premium	36 MONTHS Amount Per Month	36 MONTHS Total Life-Insurance Premium
$ 20	$ 1.23	$ .14	$ .96	$ .19	$ .79	$ .24	$ .68	$ .30
40	2.46	.28	1.91	.38	1.58	.48	1.35	.59
60	3.69	.42	2.86	.57	2.36	.72	2.02	.88
80	4.92	.56	3.81	.76	3.14	.96	2.69	1.17
1,000	61.40	7.08	47.53	9.47	39.22	12.00	33.69	14.68
1,100	67.55	7.78	52.29	10.42	43.14	13.20	37.05	16.14
1,200	73.69	8.49	57.04	11.36	47.06	14.40	40.42	17.61
1,300	79.83	9.20	61.79	12.31	50.98	15.60	43.79	19.07
1,400	85.97	9.90	66.55	13.26	54.91	16.80	47.16	20.54
1,500	92.11	10.61	71.30	14.20	58.83	18.00	50.53	22.01
1,600	98.25	11.32	76.05	15.15	62.75	19.20	53.90	23.48
1,700	104.39	12.03	80.80	16.10	66.67	20.40	57.26	24.94
1,800	110.53	12.73	85.56	17.04	70.59	21.60	60.63	26.41
1,900	116.67	13.44	90.31	17.99	74.51	22.80	64.00	27.88
2,000	122.81	14.15	95.06	18.94	78.43	24.00	67.37	29.35
2,100	128.95	14.86	99.82	19.88	82.36	25.20	70.74	30.81
2,200	135.09	15.56	104.57	20.83	86.28	26.40	74.10	32.28
2,300	141.23	16.27	109.32	21.78	90.20	27.60	77.47	33.75
2,400	147.37	16.98	114.07	22.72	94.12	28.80	80.84	35.21
2,500	153.51	17.68	118.83	23.67	98.04	30.00	84.21	36.68
2,600	159.65	18.39	123.58	24.62	101.96	31.20	87.58	38.15
2,700	165.79	19.10	128.33	25.56	105.89	32.40	90.94	39.61
2,800	171.93	19.81	133.09	26.51	109.81	33.60	94.31	41.08
2,900	178.07	20.51	137.84	27.46	113.73	34.80	97.68	42.55
3,000	184.22	21.22	142.59	28.40	117.65	36.00	101.05	44.02

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To help students understand the operating costs of owning a car.

SPECIFIC BEHAVIORAL OBJECTIVE: Each student will be able in writing to figure out the actual cost of operating a car for a week, month and year.

SUGGESTED SUBJECT AREA Math

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Have the student figure out the actual cost of operating a car going to and from work, using their parent's car as an example.	1. Have students prepare, by talking to parents and finding out: a. Miles traveled to and from work. b. Miles per gallon (average) c. Possibility of two cars. 2. Discuss a. Cost of gasoline b. Cost of oil c. Miles per gallon 3. Have the students figure out the cost for a week, month, or year, that their parents pay to operate their car.	Parents Use with unit on costs of owning an automobile

SUGGESTED CORRELATION FOR THIS ACTIVITY:

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To help students understand insurance aspects of owning a car.

SPECIFIC BEHAVIORAL OBJECTIVE: After going through this aspect of owning a car, each student will demonstrate a knowledge of the relationship of math to the insurance aspect of owning a car, by finding the cost on paper of insurance for their parent's car.

SUGGESTED SUBJECT AREA Math

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Have students go through and study the various kinds of car insurance. Have the students find the insurance costs illustrating their parents' car.	1. Introduce activity by having a speaker on car insurance. 2. Discuss: a. Importance of car insurance b. Why we need insurance c. State law on car insurance d. High grade average, lower insurance costs 3. Go through the different types and have students fill out forms for themselves (projected) or for their parents.	Mathematics for Daily Living McCormick-Mathers Co. - Cincinnati Enclosed tables Any person in the field of car insurance *Careers in Insurance by New York Life *Can be used with unit on costs of owning a car

SUGGESTED CORRELATION FOR THIS ACTIVITY:

EXAMPLE

Bruce Williams, who is married, purchased a new "C" make car on his 27th birthday. Bruce lives in an area designated as an 05 territory, and has had no accidents during the previous three years.

A. How much will he pay for $50 deductible collision insurance policy?

Solution:

Driving record factor =	.85
+Age factor =	1.00
Total factor	1.85

Basic cost for $50 deductible = $133

Total Cost = 1.85 x 133
= $246.05 or $246

BASIC COST FOR BODILY-INJURY AND PROPERTY-DAMAGE INSURANCE

	Territory					
	01	02	05	06	25	26
B.I.	$80	$77	$66	$46	$37	$31
P.D.	$35	$33	$29	$26	$22	$19

DRIVING-RECORD FACTOR

(Three-Year Period)

Number of Points	0	1	2	3	4
Factor	.85	1.05	1.50	2.00	2.50

COVERAGE-LIMIT FACTOR TABLE

(Private Passenger Car)

Bodily Injury

10/20	15/30	20/40	25/50	50/100	100/300
1.00	1.09	1.15	1.19	1.30	1.41

Property Damage

5,000	10,000	25,000	50,000
1.00	1.05	1.08	1.13

BASIC COST FOR COLLISION AND COMPREHENSIVE INSURANCE

		Territory					
		01	02	05	06	25	26
Car Make: A							
	Comprehensive	$ 24	$ 20	$ 15	$ 13	$ 12	$ 9
Age: 0–12 months	$50-Deductible	107	82	65	59	54	51
	$100-Deductible	59	49	36	33	32	30
	Comprehensive	21	17	13	11	10	8
Age: 13–36 months	$50-Deductible	93	71	57	52	48	43
	$100-Deductible	52	43	31	29	28	25
	Comprehensive	15	12	9	8	7	6
Age: 37 months and over	$50-Deductible	80	61	49	44	41	37
	$100-Deductible	45	37	27	25	24	21
Car Make: B							
	Comprehensive	33	29	22	18	17	13
Age: 0–12 months	$50-Deductible	148	114	91	82	76	71
	$100-Deductible	103	85	62	57	55	52
	Comprehensive	30	25	19	15	14	11
Age: 13–36 months	$50-Deductible	130	99	79	72	66	61
	$100-Deductible	90	74	54	50	48	45
	Comprehensive	21	17	13	11	10	8
Age: 37 months and over	$50-Deductible	111	85	68	62	57	51
	$100-Deductible	77	63	47	43	41	38
Car Make: C							
	Comprehensive	71	59	44	37	34	27
Age: 0–12 months	$50-Deductible	218	167	133	121	112	103
	$100-Deductible	159	130	96	88	84	81
	Comprehensive	60	50	37	31	29	23
Age: 13–36 months	$50-Deductible	191	146	117	106	98	91
	$100-Deductible	139	114	84	77	74	70
	Comprehensive	43	35	26	22	21	16
Age: 37 months and over	$50-Deductible	164	124	100	91	84	74
	$100-Deductible	119	98	72	66	63	61

133

AGE–FACTOR TABLE

Female — Unmarried (Under 21)

Driver Training	Factor
No	1.55
Yes	1.40

Male — Unmarried (Under 21)

Driver Training	Not-Owner Factor	Owner Factor
No	2.50	3.50
Yes	2.25	3.15

Male — Unmarried

	21–24	25–30
Not-Owner Factor	1.60	1.50
Owner Factor	2.50	1.50

Male — Married (Under 21)

Driver Training	Not-Owner Factor	Owner Factor
No	2.00	2.30
Yes	1.80	2.07

Male — Married (21–24)

Not-Owner Factor	1.40
Owner Factor	1.40

The factor for any age not covered in this table is 1.00.

Use the age factor table to have students answer such questions as "Until what age will an unmarried male have to pay extra for his car insurance?" "Until what age will an unmarried female have to pay extra?" "Until what age will a married male have to pay extra?" "A married female?"

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To help the student understand savings and checking accounts.

SPECIFIC BEHAVIORAL OBJECTIVE: Each student will gain an understanding of savings and checking accounts, and will be able, in writing, to fill out a deposit slip and fill out a check.

SUGGESTED SUBJECT AREA Math

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Have students fill out deposit slips using their parent's bank and a projected figure or one given them by their parents; also have them fill out a check.	1. Give students short introduction on the importance of savings and checking accounts. 2. Have students prepare by talking to parents about a. Savings account b. Bank they go to c. Interest they receive d. Compounded 1. Quarterly 2. Semi-annual 3. Annual 3. Invite speaker from a bank to discuss savings and checking accounts in general. 4. Have students fill out deposit slips and write out a check.	Deposit slips Any person in the banking field. Bank check

SUGGESTED CORRELATION FOR THIS ACTIVITY:

CHECKING ACCOUNT DEPOSIT TICKET

CASH CURRENCY COIN

CHECKS

TOTAL FROM OTHER SIDE

TOTAL

NET DEPOSIT

USE OTHER SIDE FOR ADDITIONAL LISTING

77-33
913

Checks and other items are received for deposit subject to the terms and conditions of this bank's collection agreement.

BE SURE EACH ITEM IS PROPERLY ENDORSED

DATE 19

dakota national bank
Bismarck, North Dakota 58501

⑆0913⑆0033⑆ 042

104

77-33
913

19

PAY TO THE ORDER OF $

DOLLARS

dakota national bank
Bismarck, North Dakota 58501

MEMO

⑆0913⑆0033⑆

CAREER DEVELOPMENT ACTIVITIES

BROAD OBJECTIVE: To acquaint students with basic economics and the effects of education when considering employment.

SPECIFIC BEHAVIORAL OBJECTIVE: After completion of this activity, the students, given a table of economic information, will be able to transfer this information to graph form.

SUGGESTED SUBJECT AREA Mathematics

SUGGESTED GRADE LEVEL Jr. - Sr. High

ACTIVITY	SUGGESTED TECHNIQUE	RESOURCE MATERIALS
Prepare a graph depicting the possible effect of a person's formal education on his life-time earnings.	Present the statistics in table form. Suggest the suitability of a vertical bar graph for illustrating this type of information. Maybe assist the students in the "ground work" of graphing scale centering, etc. Depending on their experience with graphs. After the graphs have been completed might be the most appropriate time for discussing the significance of the information graphed to the world of work. Possibly breaking the lifetime earnings down into average yearly and even average monthly incomes would be more meaningful for the students. Also, point out that there are exceptions to these statistics - People with a small amount of formal education who compensate for this with other attributes and make substantial sums of money.	Page 21, Occupational Outlook Handbook, 1972-73 Edition, Bulletin 1700, bureau of Labor Statistics, U. S. Dept. of Labor

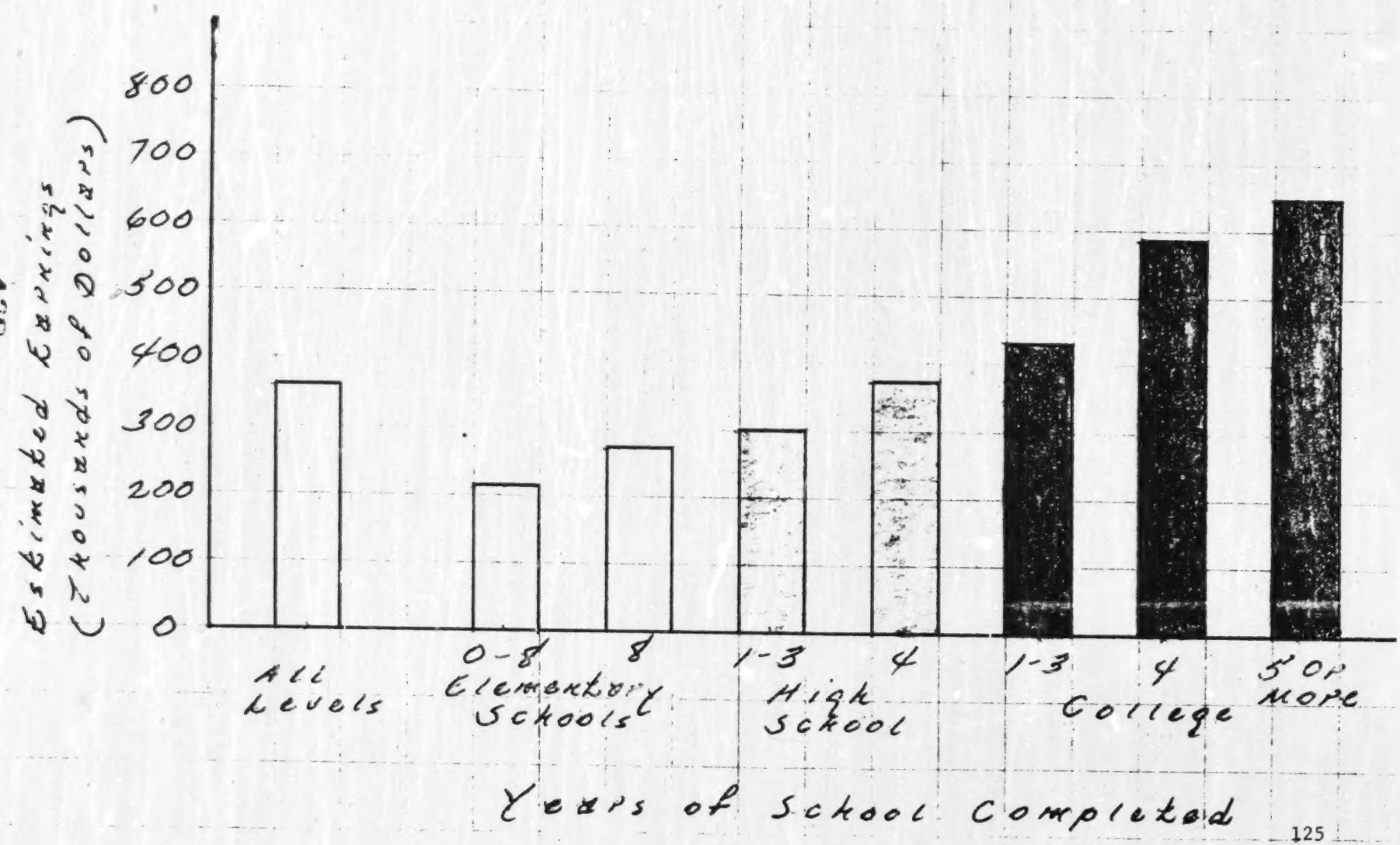
SUGGESTED CORRELATION FOR THIS ACTIVITY:

RELATIONSHIP BETWEEN YEARS OF SCHOOL COMPLETED AND ESTIMATED LIFETIME EARNINGS*

YEARS OF SCHOOL COMPLETED	LIFETIME ESTIMATED EARNINGS*
College	
5 or more	$640,000
4	580,000
1-3	430,000
High School	
4	370,000
1-3	300,000
Elementary School	
8	270,000
0-7	210,000
All Levels	360,000

* Based on 1968 Computations

RELATIONSHIP BETWEEN YEARS OF SCHOOL COMPLETED AND ESTIMATED LIFETIME EARNINGS



APPENDIX A

Guideline for an Individual Research Study of an Occupation

STUDY OF A CAREER

Research and Planning Outline Form

I. NAME OF THE CAREER OR CAREER FIELD _____

A. Is there a DOT number for this career? _____

B. Other names often used for this career? _____

_____

C. Reasons for selecting this particular career to study. _____

_____

II. HISTORY OF THE CAREER _____

_____

_____

III. PEOPLE IN THIS CAREER

A. Approximately how many people are now employed in this career field? _____

B. Briefly discuss current employment trends relating to this career.

_____

_____

C. Where are jobs related to this career most often found? Why?

_____

_____

IV. DUTIES OF THIS CAREER

A. General duties _____

_____

_____

B. Specific duties _____

_____

C. Hours of work ordinarily required _____

D. Is there anything unusual about the number of hours or nature of the work schedule which might relate to this job field? (Seasonal fluctuations, days, nights, split shifts, etc.)

V. QUALIFICATIONS OF WORKERS IN THIS FIELD:

A. Sex

B. Age

C. Health and physical

D. Personality

E. Experience

F. Aptitudes

G. Education (general level and type required)

H. Other

I. What are the most common methods of entry into this career?

Which one would you choose?

Why?

VI. EDUCATIONAL PLANNING

A. Develop a complete high school program that would be the best preparation for this career, for entry into a post-secondary school if one is necessary for this career.

B. Are post-secondary vocational-technical schools involved in the preparation for this career. Give specific examples

C. If you decide to attend a post-secondary school, what entrance requirements might you expect? What courses would you expect to take? What is the length of training? Cost of training?

D. Briefly describe any armed forces training opportunities that may relate to this career.

E. Is a college or university education required? If it is, consider the following important factors:

1. Length of college course

2. Specialized courses required for graduation or certification.

3. Approximate cost per year (on-campus or off-campus)

4. What are the scholarships, loans or grants that you could apply for to help with the cost of this training?

F. Other Training (Discuss)

1. Is this an apprenticeable program? _____

2. Company training program _____

_____

3. On-the-job training _____

_____

VII. RELATED FIELDS

A. List and briefly describe several career fields related to the one you have chosen to explore. (Refer to occupational cluster posters.)

_____

_____

_____

_____

_____

B. List other careers that could effectively utilize the training and experience. _____

_____

_____

_____

VIII. FINDING A JOB IN THIS CAREER FIELD

A. Legal requirements for entry into this field _____

_____

B. Public and/or private employment agencies that might be helpful in securing a job in this field _____

_____

_____

C. Newspaper ads (attach to separate sheet several ads pertaining to this career)

D. Briefly describe the manner in which you would go about making a direct application for a first job in this field _____

_____

_____

E. List four local firms where employment in this career field could be found _____

_____

_____

F. If you were to make application for this job, whom would you use for recommendations? List three persons. (refer to appendix A; Letter of application)

_____

_____

_____

G. Write a sample letter of application for this type of position on a separate sheet of paper and attach.

IX. EARNINGS

A. How much can you expect to make from this career?

1. Beginning salary? _____

2. Average salary? _____

3. Exceptional salary? _____

B. What expenses might you have to meet in following this career?

_____

_____

X. THE NATURE OF THE JOB

A. List some benefits other than salary that you would expect to gain from this career _____

_____

B. What hazards can you anticipate in this job field? _____

_____

_____

C. What organizations can you be expected to join? _____

_____

_____

D. What demands would this career place on a family? _____

_____

_____

XI. CAREER ADVANCEMENT

A. What are the chances for advancement in this field? _____

_____

B. Would advancement require additional training? Explain _____

_____

_____

_____

C. Would advancement require additional duties? Explain _____

_____

_____

D. Could advancement require moving to another location? Explain _____

_____

_____

E. Is there a need for continuing education to hold this position?

Explain _____

_____

XII. ARRANGE AN INTERVIEW with someone employed in this career field. Ask this resource person the same questions you have been exploring in this project and any additional questions you may have. Write a summary of this interview.

XIII. AFTER STUDYING THIS CAREER in depth, state why you would or would not be interested in making this your own career objective.

APPENDIX B

Personal Data Sheet

PERSONAL DATA SHEET

NAME: John Baker
ADDRESS: 319 Oak St., Bismarck, ND 58640
TELEPHONE: 255-3240
MARITAL STATUS: Single

AGE: 19
HEIGHT: 5'11"
WEIGHT: 160

EDUCATION: Elementary School: Cunningham School; graduated 1965
High School: Roosevelt High School; graduated 1969
Commercial course with general business major
Electives included business procedures and bookkeeping

PREVIOUS EMPLOYMENT: Clerk, National Insurance Co., 145 N. LaSalle St., Centerville,
June 1969 to present
Clerk, Check-Clearing Dept., State Bank,
917 Dearborn St., Centerville,
June - September 1968
Supervisor: Mr. H. C. Smith

SCHOOL ACTIVITIES: Business Club, football team, Student Council

PRESENT INTERESTS: Photography, camping, record collecting

REFERENCES: Mr. T. R. Preston
Section Manager
National Insurance Co.
145 N. LaSalle St.
Centerville, Ill. 62201
DEarborn 2-9820

Mr. L. E. Fisher
Accounting Instructor, Roosevelt High School
2034 E. Main St.
Centerville, Ill. 62201
NAtional 8-6880

Mr. P. A. Johnson
4839 South Boulevard
Centerville, Ill. 62201
ALpine 1-4906

APPENDIX C

Occupational Clusters for Math

DIAGRAMS FOR EXPLORING OCCUPATIONS RELATED TO SCHOOL SUBJECTS

The diagrams on the following pages are designed to assist students who are undecided about a specific occupation, but have interest in one of the major subject areas. Each occupation has been coded according to the Dictionary of Occupational Titles for easy reference. Students who desire to obtain additional information about a certain occupation can refer to the professional file by the Dictionary of Occupational Titles code number.

The Dictionary of Occupational Titles is a United States Department of Labor publication, and consists of five points:

(1) The occupational title,

(2) the industry designation or work activity with which the occupation is identified,

(3) classification by code number,

(4) alternate titles, and

(5) a brief description of the duties of the occupation.

The D. O. T. is available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D, C, 20402.

The above refers to eh D.O.T. (Dictionary of Occupational Titles) 1965 Third Edition, Volumns I & II.

Suggestion: The diagrams can be used on bulletin boards or for class discussions. (We would be interested to know how your school uses this information, particularly if the methods are different from those listed above.)

Mail Order Form to: D.O.T. ORDER FORM (All orders are prepaid)
Superintendent of Documents, Government Printing Office, Washington D. C. 20402

Enclosed find $_____ (check or money order)

Please send me _____ Volume I - Definitions of Titles - at $5.00 each

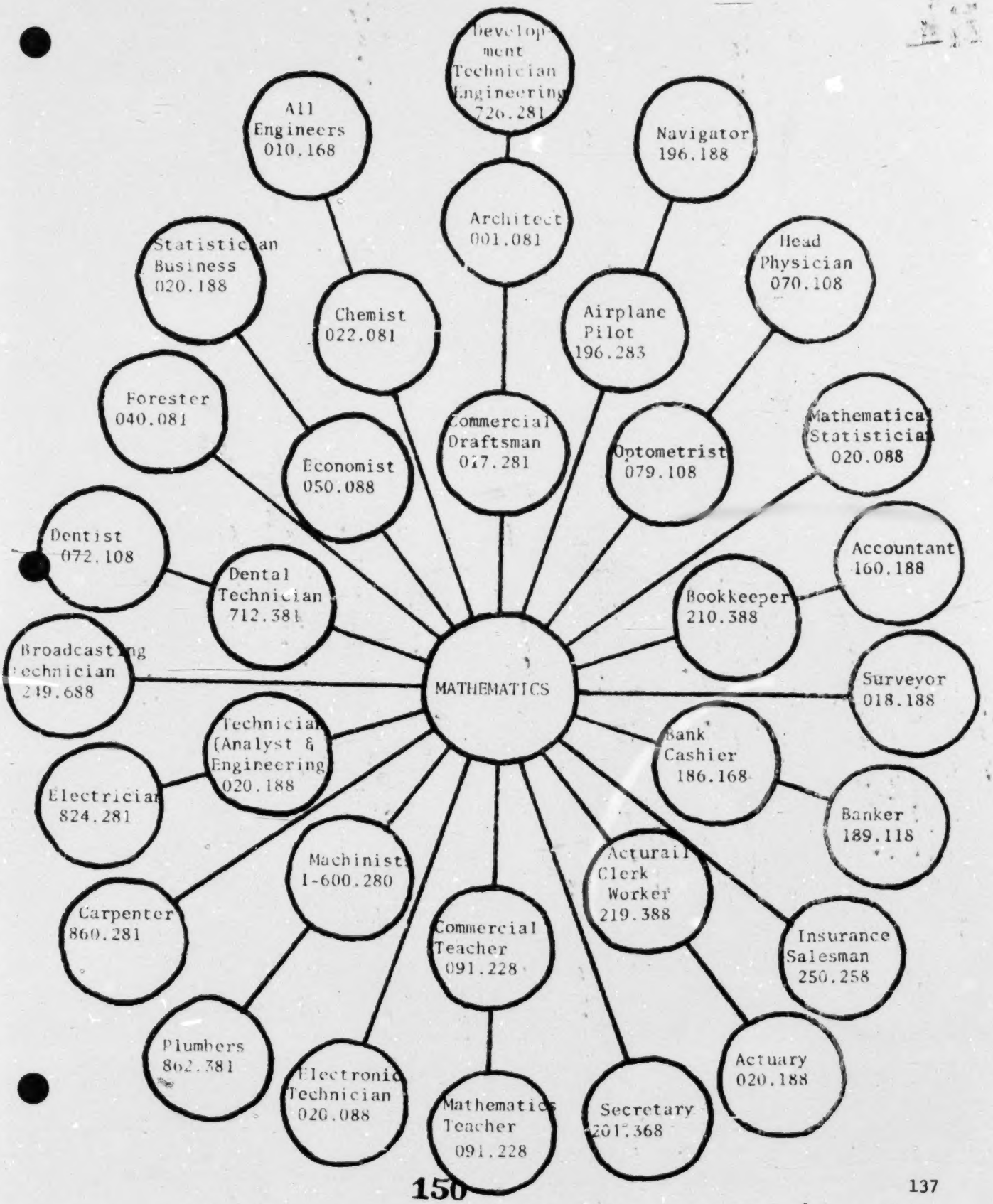
Please send me _____ Volume II - Occupational Classification - at $4.25 each

Name_____School_____

Street Address_____

City, State and ZIP Code_____

SOME OCCUPATIONS RELATED TO INTEREST AND ABILITY IN MATHEMATICS



CONSTRUCTION

WOOD

The grouping together of those occupations utilizing wood, wood products, and wood building systems as the primary building, assembling, and working materials. Included are occupations which by tradition and practice are normally included as a part of carpentry programs.

- Framing
- Flooring
- Forming
- Trimming
- Roofing
- Material Distributing

METAL

The grouping together of those occupations utilizing metal, metal products, and metal building systems as primary building, assembling, and working materials.

- Welding
- Sheetmetal Working
- Plumbing
- Pipefitting
- Air/Cond. and Heating
- Millwright
- Material Distributing

MASONRY

The grouping together of those occupations utilizing masonry, clay products, and masonry building systems as primary building, assembling, and working materials.

- Brick and Block Laying
- Concrete Working
- Tile and Terrazzo Working
- Plastering
- Material Distributing

ELECTRICAL

The grouping together of those occupations utilizing electrical materials, related electrical components, and electrical building systems as primary assembling and working materials.

- Residential Wiring
- Commercial Wiring
- Industrial Wiring
- Material Distributing

FINISHING

The grouping together of those occupations utilizing finishing products and finishing building systems as the primary assembling and working materials.

- Painting and Papering
- Insulating
- Glass and Glazing
- Sheetrocking
- Floor Covering
- Landscaping
- Material Distributing

HEAVY EQUIPMENT OPERATIONS

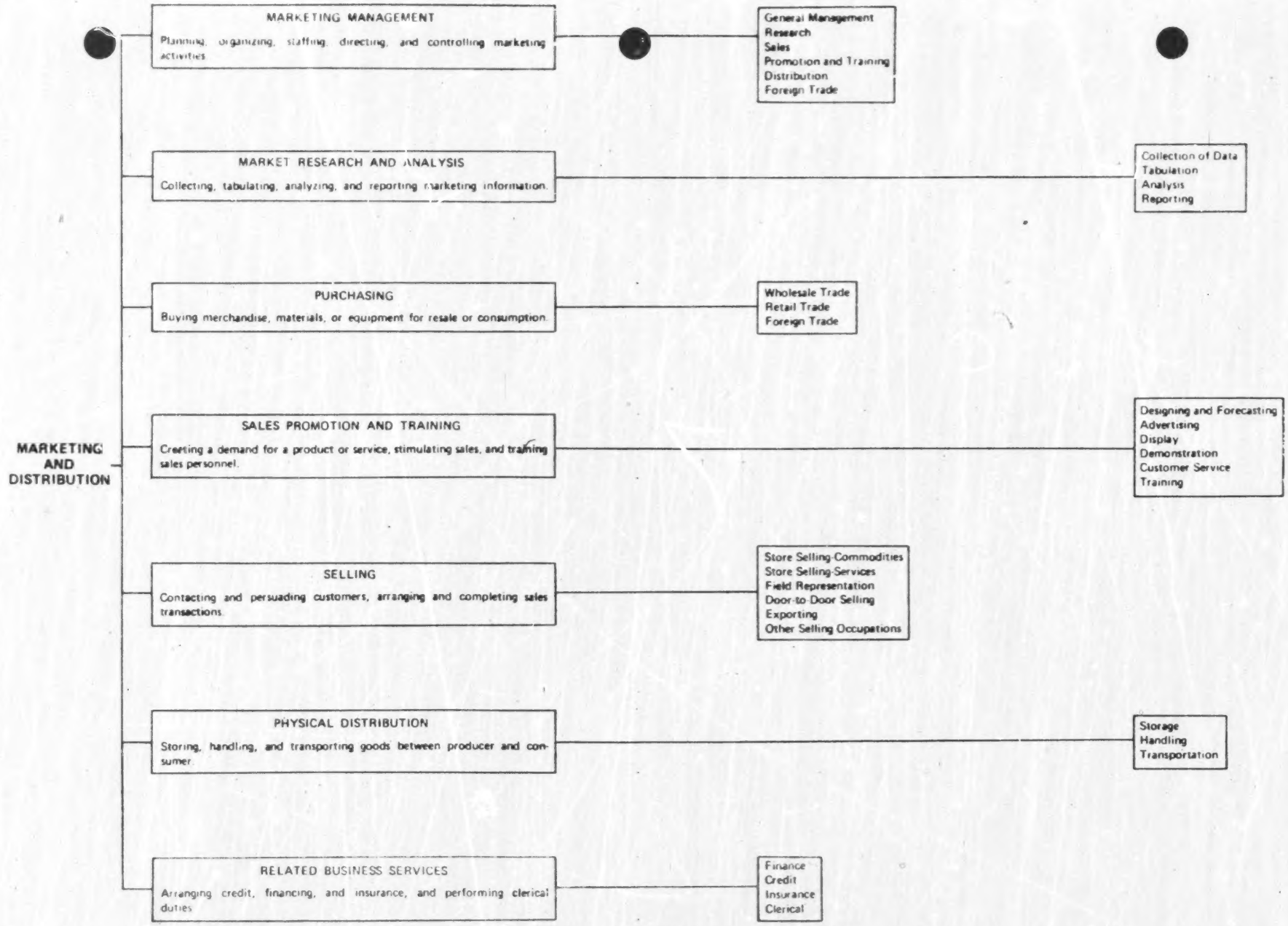
The grouping together of those occupations utilizing the operation and maintenance of heavy equipment.

- Equipment Operating
- Equipment Maintaining
- Material Distributing

ENGINEERING AND SUPPORT SERVICES

The grouping together of those occupations utilizing engineering and technical-supportive training.

- Construction Drafting and Arch. Drawing
- Estimating
- Expediting
- Surveying
- Testing and Inspecting


MARKETING AND DISTRIBUTION
MARKETING MANAGEMENT
Planning, organizing, staffing, directing, and controlling marketing activities
General Management
Research
Sales
Promotion and Training
Distribution
Foreign Trade
MARKET RESEARCH AND ANALYSIS
Collecting, tabulating, analyzing, and reporting marketing information.
Collection of Data
Tabulation
Analysis
Reporting
PURCHASING
Buying merchandise, materials, or equipment for resale or consumption.
Wholesale Trade
Retail Trade
Foreign Trade
SALES PROMOTION AND TRAINING
Creating a demand for a product or service, stimulating sales, and training sales personnel.
Designing and Forecasting
Advertising
Display
Demonstration
Customer Service
Training
SELLING
Contacting and persuading customers, arranging and completing sales transactions.
Store Selling-Commodities
Store Selling-Services
Field Representation
Door-to-Door Selling
Exporting
Other Selling Occupations
PHYSICAL DISTRIBUTION
Storing, handling, and transporting goods between producer and consumer.
Storage
Handling
Transportation
RELATED BUSINESS SERVICES
Arranging credit, financing, and insurance, and performing clerical duties
Finance
Credit
Insurance
Clerical

APPENDIX D

Guidelines For Use of Resource Persons

Letter To Resource Person

Dear _____

My students are studying _____
We would like to have some first hand knowledge about this area. We are very interested in the work that you do at your job. Below are listed some areas that we would like to have included in your talk to the class.

1. Title of job
2. Duties
3. Training or preparation required.
4. Approximate starting salary - salary after ten years (average).
5. Have you been doing this same type of work all of your working life. ____
6. Demand for such a job.
7. Supply of workers for this occupation.
8. Physical characteristics needed.
9. Social characteristics needed.
10. Do you work alone or with others.
11. Do you need to get along and cooperate with other workers.
12. What school courses helped a great deal in preparing you for this work?
13. How do you feel after a days work? Why?
14. Why do you work?
15. Do you like this job?
16. What are the good and bad points about it?
17. How and where training can be obtained.
18. Leave plenty of time for questions.

Listed below is some information you may find useful.

Subject area _____
Number of students _____
Description of facilities and equipment available _____

_____

Thank you very much for consenting to spend some time with our class.

Sincerely yours,

Teacher

Follow - up of Resource Person

1. Discuss things they learned from visit (what do they know now about this job that they did not know in the past).

2. Discuss:

   a. What are the employment opportunities for these workers?

   b. Would you like this type of work?

   c. What characteristics do you have that would be valuable in this work?

   d. What must you improve on if you were to go into this line of work?

   e. What requirements (educational, physical, etc.) are necessary for this work?

   f. What geographical factors, if any, determine the location of this type of work?

RESOURCE PEOPLE GUIDELINES

Preparation:

1. Make the initial contact.

2. Teacher should obtain background information on person so she can make the introduction.

3. Provide information to the speaker describing the type and number of students, the program, facilities and equipment you can provide, things to cover, etc. (letter for this purpose attached)

4. Cover the area concerning the resource person before he or she comes to the classroom.

5. Give students some general knowledge of this person's field.

6. Talk about questions that they wish to have answered. (general) Have these organized so that all questions can be asked without repetition.

7. If question period lags the teacher should ask questions to bring out things that haven't been covered thus far.

8. Have the resource person ask students "What do you think I do?" before he begins his presentation.

9. Follow - up of field trip for evaluation purposes.

APPENDIX E

Guideline For Field Trips
For Career Education

Guideline for Field Trips for Career Development

A. Teacher-Pupil Planning

1. Plan type of trip.
2. Are students interested in going on field trip?
3. Is trip justifiable? (Can classroom provide same learning?)
4. Reason for taking trip:
   a. Develop awareness of different workers
   b. Helping them observe working conditions
   c. Awareness of interdependence of workers

B. Teacher Preparation

1. Permission from principal
2. Plans for transportation
3. Permission slips
   Develop form-sheet for the tour of business place
4. Contact business tour establishment
   a. Permission to come and definite date and time
   b. Provide information for business place being toured
      1) Number of students
      2) Age, grade level, etc.
      3) What material covered by students previously
      4) Questions students might ask
      5) Safety measures to be observed
      6) Questions workers might ask
   c. Secure any information or materials from business for students to review before going on trip

C. Pupil Preparation

1. Watch for:
   a. Working conditions
   b. Duties of workers
   c. Clothes they wear - appropriate
   d. Number of workers
   e. Safety
   f. Do workers enjoy the kind of work they are doing
2. Special instructions
   a. Appropriate clothing
   b. Conduct on tour
   c. Safety practices
   d. Courtesy throughout tour
   e. Departure time

D. Follow - Up

1. Did you enjoy the trip?
2. Would you recommend the trip for others? Why? Why not?
3. Were all questions answered?
4. Did you observe any kind of work you would enjoy doing?
5. What did you learn on this trip that you didn't learn in the classroom?

APPENDIX F

Addresses for Suppliers
of Resource Material

ADDRESS OF SUPPLIERS OF RESOURCE MATERIALS

Academy Films
748 West Seward St.
Hollywood, Calif. 90038

Allyn & Bacon Inc.
College Division
Rockleigh, NJ 07647

American Book Company
300 Pike Street
Cincinnati, Ohio 45202

American Guidance Service
Publishers Bldg.
Circle Pines, Minn. 44014

Association-Sterling Films
512 Burlington Ave.
LaGrange, IL. 60525

Association Films
660 Madison Ave.
New York, NY 10022

BFA (Bailey-Film Assoc.)
2211 Michigan Ave.
Santa Monica, CA 90404

Benefic Press
10300 W. Roosevelt Rd.
Westchester, IL 60153

Bobbs & Merrill
4300 W. 62nd St.
Indianapolis, Ind. 46268

Careers, Inc.
P. O. Box 135
Largo, Florida 33540

Childrens Press
1224 W. Van Buren St.
Chicago, IL 60607

The Child's World, Inc.
515 N. Front St., Box 711
Mankato, Minn. 56001

Chilton Book Co.
401 Walnut St.
Philadelphia, PA 19106

Churchill Films
662 N. Robertson Blvd.
Los Angeles, Calif. 90069

David C. Cook Pub. Co.
Elgin,
Illinois 60120

Communico
1735 Administration Dr.
St. Louis, MO 63141

Coronet Films
Coronet Building
65 E. South Water St.
Chicago, IL 60601

Coward-McCann, Inc.
200 Madison Ave.
New York, NY 10016

Crowell, Thomas Y.
201 Park Ave. S.
New York, NY 10003

Denoyer-Geppert
5235 Ravenswood Ave.
Chicago, IL 60640

Developmental Learning Corp.
3505 N. Ashland Ave.
Chicago, IL 60657

Dillon Press
108 Washington Ave. N.
Minneapolis, MN 55401

Walt Disney Productions
Educational Film Division
500 S. Buenavista Ave.
Burbank, Calif. 91503

Dodd, Mead & Company
79 Madison Ave.
New York, NY 10016

Doubleday & Company
501 Franklin Ave.
Garden City, NY 11530

Edu-Craft
(See Denoyer-
Geppert)

Educators Progress Service, Inc.
212-214 Center St.
Randolph, Wisc. 53956

Educational Progress Corp.
8538 E. 41st St.
Tulsa, OK 74145

Encyclopaedia Brittanica
Preview/Rental Library
1822 Pickwick Ave.
Glenview, IL 60025

Eye Gate House
146-01 Archer St.
Jamaica, NY 11435

Fearon Publishers, Inc.
2165 Park Blvd.
Palo Alto, Calif. 94306

Filmstrip House
432 Park Ave. S.
New York, NY 10016

Filmstrip of the Month
Popular Science Pub. Co.
355 Lexington Ave.
New York, NY 10017

Finney Company
3350 Gorham Ave.
Minneapolis, MN. 55426

Florida Development Commission
Film Library
Collins Bldg.
Tallahasee, Florida

Follett Educational Corp.
Customer Service Center
Box 5705
Chicago, IL 60680

Ford Market, Inc.
63 St. Anthony Blvd. N. E.
Minneapolis, MN 55421

Gel-Stenn
911-913 S. Hill St.
Los Angeles, Calif. 90015

Ginn & Company
Staler Building
125 Second Ave.
Boston, Mass. 02154

Grove Press
80 University Pl.
New York, NY 10003

Guidance Associates
41 Washington Ave.
Pleasantville, NY 10570

E. M. Hale & Co., Inc.
1201 S. Hastings Way
Eau Claire, WI 54701

Harper & Row Publishers
Keystone Industrial Park
Scranton, PA 18512

Harvey House, Inc.
5 S. Buckhout St.
New York, NY 10533

Hawthorne Book, Inc.
70 Fifth Ave.
New York, NY 10011

Highlights for Children
2300 W. Fifth Ave.
Columbus, OH 43216

Holt, Rinehart & Winston, Inc.
383 Madison Ave.
New York, NY 10017

Houghton Mifflin Co.
1900 S. Batavia Ave.
Geneva, IL 60134

Imperial Film Co.
4404 S. Florida Ave.
Lakeland, Florida 33803

Information Systems & Service
P. O. Box 1231
Milwaukee, Wisc. 53201

Instructo Corp.
Paoli,
Pennsylvania 19301

Jam Handy
2781 E. Grand Blvd.
Detroit, Michigan 48211

Alfred A. Knopf, Inc.
501 Madison Ave.
New York, NY 10022

Laidlaw Brothers
Thatcher & Madison
River Forest, IL 60305

Little Brown & Co.
34 Beacon St.
Boston, MA 02106

Long Filmslide Service
7505 Fairmount Ave.
El Cerrito, Calif.

Marrow Publications
4163 Market St.
San Diego, Calif. 92101

Macrae-Smith Co.
225 S. 15th St.
Philadelphia, PA 19102

McGraw-Hill Book Co.
330 W. 42nd St.
New York, NY 10036

Melmont Publishers
(See Childrens Press)

Milton Bradley Aids
74 Park St.
Springfield Mass. 01102

Modern Talking Picture Service
9129 Lyndale Ave. S.
Minneapolis, MN 55420

National Dairy Council
111 North Canal St.
Chicago, IL 60606

National Forum Foundation
(See American Guidance Service)

National Gallery of Art
Extension Service
Washington, DC

Net Film Service
Indiana University
Bloomington, IN 47405

F. A. Owens Publishing Co.
Dansville,
New York

Oxford Book Co.
387 Park Ave. S.
New York, NY 10016

G. P. Putnam
200 Madison Ave.
New York, NY 10016

Q Ed Productions
P. O. Box 1608
Burbank, Calif. 91505

Radim Films
220 W. 42nd St.
New York, NY 10036

Random House
201 East 50th St.
New York, NY 10022

Richard Rosen Press
29 E. 21st St.
New York, NY 10010

Rider College
Public Information Unit
Trenton, NJ 08602

Scholastic Book Service
2931 E. McCarty St.
Jefferson City, MO 65101

Scholastic Magazine, Inc.
(Weekly Reader)
902 Sylvan Ave.
Englewood Cliffs, NJ 07632

Science Research Assoc.
259 E. Erie St.
Chicago, IL 60611

Scott, Foresman & Co.
3145 Piedmont Rd. N. E.
Glenview, IL 60025

Sextant Systems
(See Information Systems
& Services)

Shell Film Library
450 N. Meridian St.
Indianapolis, Ind. 46204

Silver Burdett Company
460 S. N. W. Highway
Park Ridge, IL 60068

Society for Visual Education
1345 Diversey Parkway
Chicago, IL 60614

Steck-Vaughn Co.
Box 2028
Austin, Texas 78767

Sterling Publishing Co., Inc.
419 Park Ave. S.
New York, NY 10016

Taylor Publishing Co.
Box 597
Dallas, Texas 75221

Texaco Inc.
Mr. Smithwick
1570 Grant St.
Denver, Colo.

Thompkins Films
Box 46611
Los Angeles, Calif. 90046

Trend Enterprises
Wh[illegible] Bear Lake,
Minnesota

U. S. Government Printing Office
Superintendent of Documents
Washington, DC 20402

U. S. Dept. of Labor
240 New Federal Bldg.
653 Second Ave. N.
Fargo, ND 58102

Viking Press
625 Madison Ave.
New York, NY 10022

VISTA
1111 18th St. N. W.
Washington, DC 20506

J. Weston Walch, Publisher
Box 1075
Portland, Maine 04104

Franklin Watts, Inc.
575 Lexington Ave.
New York, NY 10022

Weekly Reader
(See Scholastic Magazine)

Westminster Press
Witherspoon Bldg.
Juniper & Walnut St.
Philadelphia, PA 19107

Weston Woods
Newtown Turnpike
Weston, Conn. 06880

Whitman, Albert
560 W. Lake St.
Chicago, IL 60606

John Wiley & Sons
605 Third Ave.
New York, NY 10016

H. Wilson Corporation
555 West Taft Drive
South Holland, IL 60473